**MCA General**

**SCHEME & SYLLABUS**

**BATCH: 2023-25**

**INDEX**

| **S. No** | **Contents** | **Page No.** |
| --- | --- | --- |
| 1 | Vision, Mission And Quality Policy Of University |  |
| 2 | Knowledge Wheel |  |
| 3 | Preamble |  |
| 4 | About Program and Program Outcomes (POs) |  |
| 5 | Examination System |  |
| 6 | Assessment & Grade Point Average: SGPA, CGPA |  |
| 7 | Guidelines for MOOC Courses |  |
| 8 | Teaching Scheme of all Semesters |  |
| 9 | Teaching Syllabus of all Semesters |  |

**Disclaimer:** The scheme, syllabus and other materials published in this booklet may be changed or modified as per the requirement after approval of competent authority. The decision taken by the management of Poornima University will be final and abiding to all.

**Student Details**



Name of Student:

Name of Program:

Semester: Year: Batch:

Faculty of:

******

***VISION***

To create knowledge based society with scientific temper, team spirit and dignity of labor to face global competitive challenges.

***Mission***

To evolve and develop skill based systems for effective delivery of knowledge so as to equip young professionals with dedication and commitment to excellence in all spheres of life.

***Quality Policy***

To provide Quality Education through Faculty development, updating of facilities and continual improvement meeting University norms and keeping stake holders satisfied.

***Knowledge Wheel***

At Poornima, the academic atmosphere is a rare blend of modern technical as well as soft skills and traditional systems of learning processes.



**About Program and Program Outcomes (PO):**

**Title of the Programme:** Masters of Computer Applications (MCA)

**Nature of the Programme:** MCA is a two year full-time programme.

**Program Outcomes (PO) :**

Post Graduates will be able to:

**PO 1: Computational Knowledge:** Apply knowledge of computing fundamentals, computing specialisation, mathematics, and domain knowledge appropriate for the computing specialisation to the abstraction and conceptualisation of computing models from defined problems and requirements.

**PO 2: Problem Analysis:** Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.

**PO 3: Design /Development of Solutions:** Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

**PO 4: Conduct investigations of complex Computing problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO 5: Modern Tool Usage:** Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.

**PO 6: Professional Ethics:** Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices.

**PO 7: Life-long Learning:** Recognise the need, and have the ability, to engage in independent learning for continual development as a computing professional.

**PO 8: Project management and finance:** Demonstrate knowledge and understanding of the computing and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO 9: Communication Efficacy:** Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.

**PO 10: Societal and Environmental Concern:** Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practices.

**PO 11: Individual and Team Work:** Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.

**PO 12: Innovation and Entrepreneurship:** Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

**Examination System :**

1. **Marks Distribution of Theory Course:**



1. **Marks Distribution of Practical Course :**





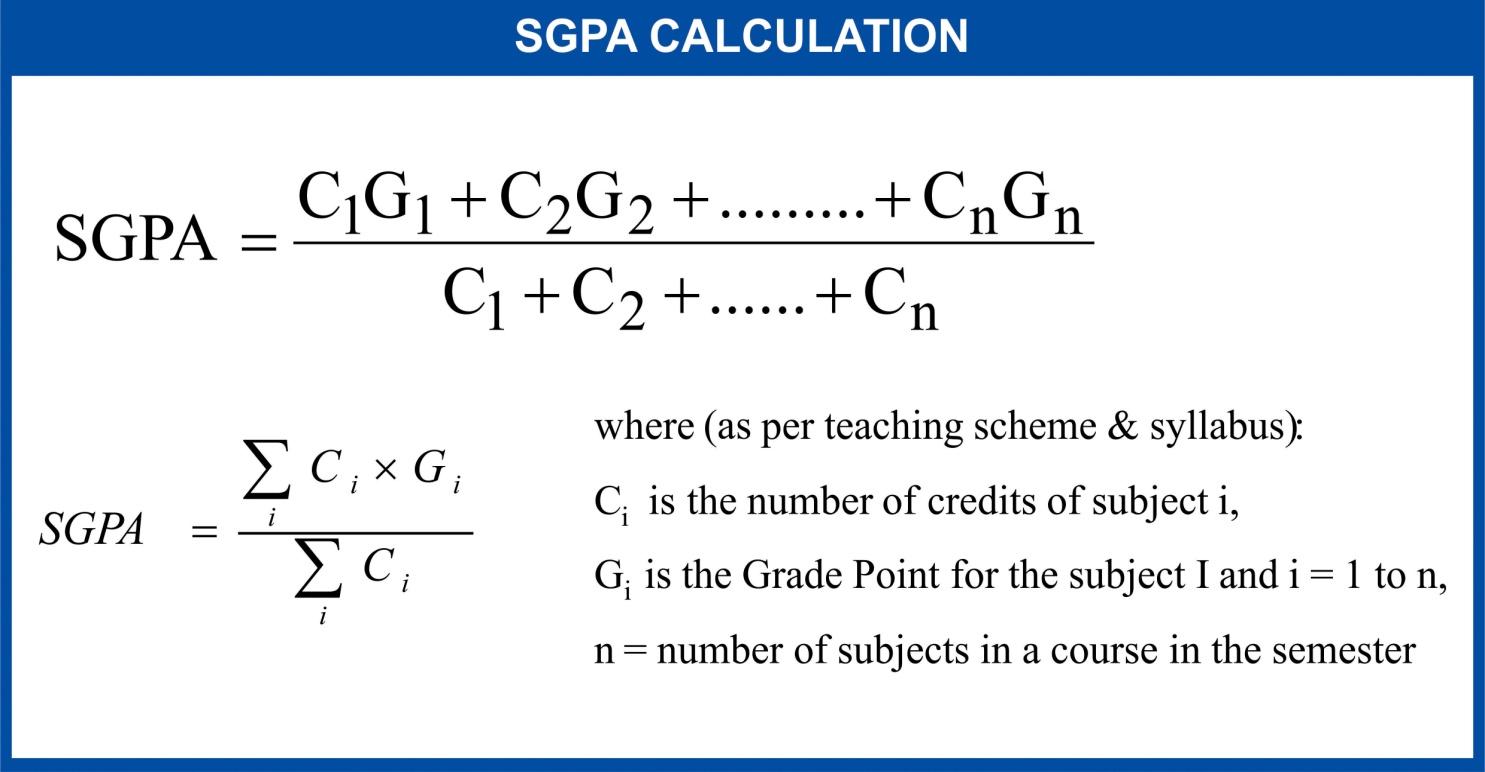
**CO Wise Marks Distribution:**

| **Exam Entity** | **Theory Subject** | | **Practical/ Studio Subject** | |
| --- | --- | --- | --- | --- |
| **Maximum Marks** | **CO to be Covered** | **CO to be Covered** | **Maximum Marks** |
| **CIE-I** | 16 ( 8 + 8) | 1 & 2 | 1 & 2 | 24 (12 + 12) |
| **MSE** | 16 ( 8 + 8) | 3 & 4 | 3 & 4 | 24 (12 + 12) |
| **CIE-II (Activity/ Assignment )** | 8 (8) | 5 | 5 | 12 (12) |
| **ESE** | 60 | - | - | 40 |
| **TOTAL** | 100 | - | - | 100 |

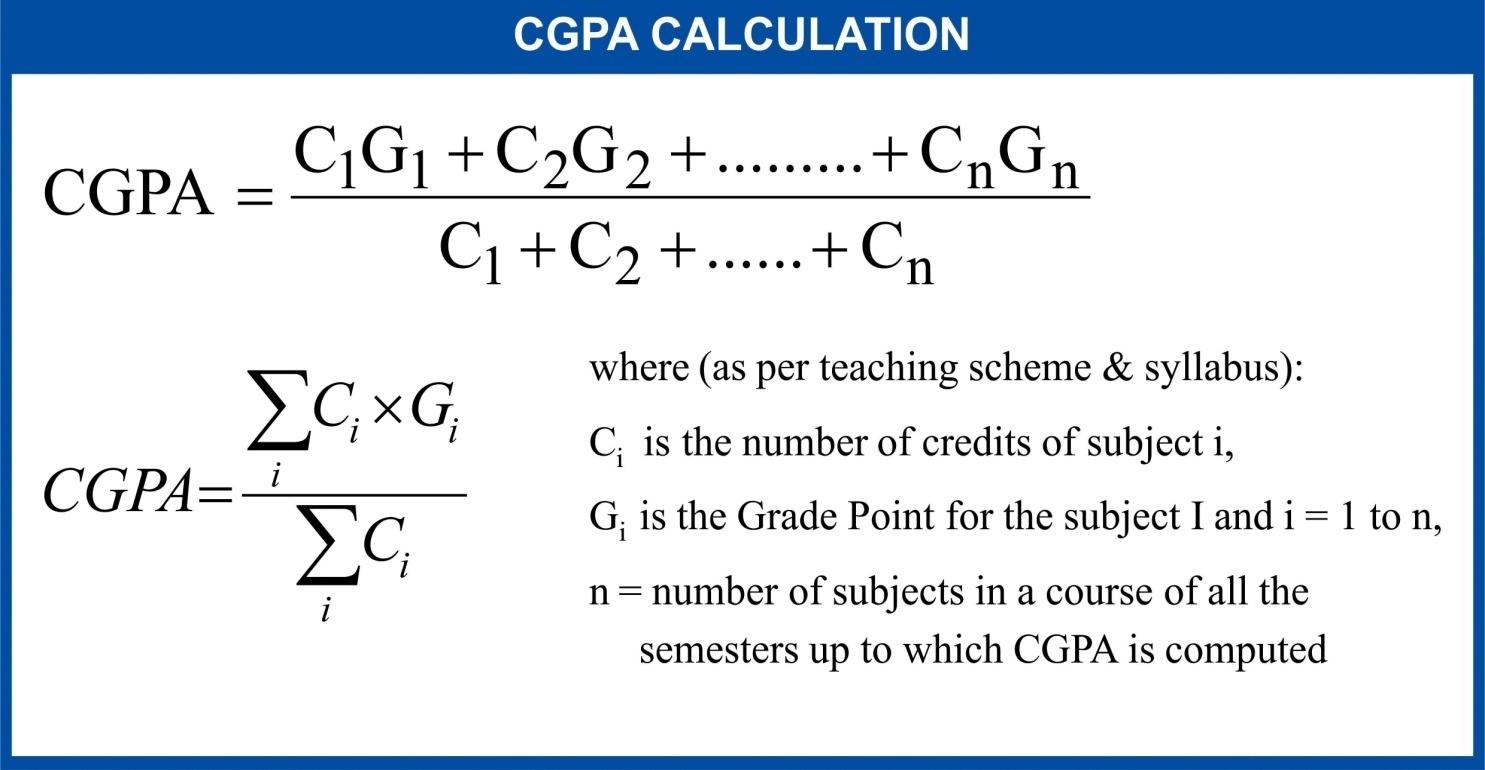
**Minimum Passing Percentage in All Exams:**

| **S No.** | **Program Name** | **Minimum Passing Percentage in** | | |
| --- | --- | --- | --- | --- |
| **IE**  **Component** | **ESE**  **Component** | **Total**  **Component** |
| **1** | Course Work for PhD Registration | **-** | **-** | **50%** |
| **2** | B. Arch. | **-** | **45%** | **50%** |
| **3** | MBA, MCA, M.Des., M.Tech., M.Plan, MHA, MPH | **-** | **40%** | **40%** |
| **4** | MBA, MCA, M.Des., M.Tech., M.Plan, MHA, MPH | **-** | **35%** | **35%** |

**SGPA Calculation**

****

**CGPA Calculation**

****

**Grading Table:**

**Applicable for B.Arch. & Ph.D. Courses Applicable for All Courses except B.Arch. & Ph.D.**

| Academic Performance | Grade | Grade Point | Marks Range (in %) |  | Academic Performance | Grade | Grade Point | Marks Range (in %) |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Outstanding | O | 10 | 90≤ x ≤100 | Outstanding | O | 10 | 90≤ x ≤100 |
| Excellent | A+ | 9 | 80≤ x <90 | Excellent | A+ | 9 | 80≤ x <90 |
| Very Good | A | 8 | 70≤ x <80 | Very Good | A | 8 | 70≤ x <80 |
| Good | B+ | 7 | 60≤ x <70 | Good | B+ | 7 | 60≤ x <70 |
| Above Average | B | 6 | 50≤ x <60 | Above Average | B | 6 | 50≤ x <60 |
| Fail | F | 0 | x <50 | Average | C | 5 | 40≤ x <50 |
| Absent | Ab | 0 | Absent | Pass | P | 4 | 35≤ x <40 |
|  |  |  |  | Fail | F | 0 | x <35 |
|  |  |  |  |  | Absent | Ab | 0 | Absent |

**CGPA to percentage conversion rule:**

**Equivalent % of Marks in the Program = *CGPA* \*10**

**Award of Class**

| **CGPA** | **Percentage** | **Equivalent Division** |
| --- | --- | --- |
| 7.50 ≤ CGPA | 75% or more | First Division with Distinction |
| 6.00 ≤ CGPA < 7.50 | 60% ≤ x <75% | First Division |
| 5.00 ≤ CGPA < 6.00 | 50% ≤ x <60% | Second Division |
| 4.00 ≤ CGPA < 5.00 | 40% ≤ x < 50% | Pass Class |

**Guidelines for Massive Open Online Courses (MOOCs)**

**(Session 2023-24)**

Poornima University, in its never ending endeavor to equip students with best-of-class learning and knowledge, has undertaken to include MOOC courses as part of its credit scheme from session 2023-24 onwards. The objective behind this is to enable students to study courses designed by the best teachers in the country and to scale their knowledge base with the rest of learners from the nation. The MOOCs which are included under this scheme is can be chosen from SWAYAM and NPTEL.

1. **Introduction of MOOCs: SWAYAM and NPTEL**

**About SWAYAM:**

SWAYAM is a programme initiated by Government of India and designed to achieve the three cardinal principles of Education Policy viz., access, equity and quality. The objective of this effort is to take the best teaching learning resources to all, including the most disadvantaged. SWAYAM seeks to bridge the digital divide for students who have hitherto remained untouched by the digital revolution and have not been able to join the mainstream of the knowledge economy.

This is done through a platform that facilitates hosting of all the courses, taught in classrooms to be accessed by anyone, anywhere at any time. All the courses are interactive, prepared by the best teachers in the country and are available, free of cost to any learner. However learners wanting a SWAYAM certificate should register for the final proctored exams that come at a fee and attend in-person at designated centers on specified dates. Eligibility for the certificate will be announced on the course page and learners will get certificates only if this criteria is matched.

The courses hosted on SWAYAM are in 4 quadrants – (1) video lecture, (2) specially prepared reading material that can be downloaded/printed (3) self-assessment tests through tests and quizzes and (4) an online discussion forum for clearing the doubts. Steps have been taken to enrich the learning experience by using audio-video and multi-media and state of the art pedagogy / technology.

In order to ensure that best quality content is produced and delivered, nine National Coordinators have been appointed. They are:

1. [AICTE](https://swayam.gov.in/nc_details/AICTE) (All India Council for Technical Education) for self-paced and international courses
2. [NPTEL](https://swayam.gov.in/nc_details/NPTEL) (National Programme on Technology Enhanced Learning) for Engineering
3. [UGC](https://swayam.gov.in/nc_details/UGC) (University Grants Commission) for non-technical post-graduation education
4. [CEC](https://swayam.gov.in/nc_details/CEC) (Consortium for Educational Communication) for under-graduate education
5. [NCERT](https://swayam.gov.in/nc_details/NCERT) (National Council of Educational Research and Training) for school education
6. [NIOS](https://swayam.gov.in/nc_details/NIOS) (National Institute of Open Schooling) for school education
7. [IGNOU](https://swayam.gov.in/nc_details/IGNOU) (Indira Gandhi National Open University) for out-of-school students
8. [IIMB](https://swayam.gov.in/nc_details/IIMB) (Indian Institute of Management, Bangalore) for management studies
9. [NITTTR](https://swayam.gov.in/nc_details/NITTTR) (National Institute of Technical Teachers Training and Research) for Teacher Training programme

Two types of courses are offered on SWAYAM platform: Credit Courses and Non- Credit Courses. Credit courses are offered for each semester in January and July every year. The list is available on SWAYAM official website: <https://onlinecourses.swayam2.ac.in/>

**About NPTEL:**

NPTEL (National Programme on Technology Enhanced Learning), is a joint venture of the IITs and IISc, funded by the Ministry of Education (MoE) Government of India, and was launched in 2003. Initially started as a project to take quality education to all corners of the country, NPTEL now offers close to 600+ courses for certification every semester in about 22 disciplines.

**Some highlights:**

* + Largest online repository in the world of courses in engineering, basic sciences and selected humanities and management subjects
  + YouTube channel for NPTEL – most subscribed educational channel, 1.3 billion views and 40+ lakhs subscribers
  + More than 56000 hours of video content, transcribed and subtitled
  + Most accessed library of peer-reviewed educational content in the world
  + Translation of more than 12000 hrs of English transcripts in regional Indian languages

**NPTEL Online Certification:**

The objective of enabling students obtain certificates for courses is to make students employable in the industry or pursue a suitable higher education programme. Through an online portal, 4, 8, or 12-week online courses, typically on topics relevant to students in all years of higher education along with basic core courses in sciences and humanities with exposure to relevant tools and technologies, are being offered. Enrolment to and learning from these courses is free. Following these online courses, an in-person, proctored certification exam is conducted and a certificate is provided through the participating institutions and industry, as applicable.

Some statistics regarding the open online courses since March 2014 till Dec 2021

Completed courses: 3496;

Enrollments across courses: 1.58 CRORE +

Number of exam registrations: 15.1 LAKH +

All the statistics pertaining to completed courses are available at [https://beta.nptel.ac.in/courses.](https://nptel.ac.in/courses)  
All courses are completely free to enroll and learn from. The certification exam is optional and comes at a fee of Rs 1000/course exam.

1. **MOOCs at Poornima University:**

MOOCs envelops best in class teaching - learning processes along with meeting the requirements of various courses in terms of quality of teaching and evaluation system. To promote the MOOCs among students of Poornima University, it is decided to consider the credits earned through MOOCs.

**(a) Options for MOOCs at Poornima University**

**(For this document, only those MOOCs will be considered which are available on SWAYAM & NPTEL platforms)**

* + Credit and Non-credit SWAYAM MOOCs can be opted by anyone, anytime, anywhere and in any language. However, prior-permission of the University Authorities is mandatory if the credits are to be transferred to regular degree.
  + In case of credit courses, there are two ways to opt these courses for the purpose of credit transfer to PU system as given below:

**OPTION–I: As Open Elective (for batches entered till 2022) / Multidisciplinary Courses (for batches admitted from 2023-24 onwards):**

Open Elective (for batches entered till 2022) / Multidisciplinary Courses (for batches admitted from 2023-24 onwards) are available at University level in offline mode for which relevant booklets are already published. **These courses carries 02 credits.** These category/type of courses (similar/different) are also available as MOOC courses. The respective Deans / HODs shall provide both the options to all the students to either select offline courses or MOOCs as per details given below:

* + Deans / HODs shall prepare a list of upto 05 appropriate MOOC courses of 02/03 credits each, well in advance (at-least 15 days prior to commencement of semester) and take approval from the Office of Dean, Academics / Pro-President, PU.
  + After approval, the respective Deans / HODs shall circulate a notice to all their respective students so that they can select any one course from the list, the credits **(only 02)** of which will be counted against Open Elective/ Multidisciplinary courses pertaining to that particular semester.
  + If the students are not willing to opt for MOOC Open Elective/ Multidisciplinary course, they can proceed with the current offline practice of opting for Multidisciplinary courses.
  + The tutor of the class shall monitor the progress (assignments, feedback, any problem etc.) on weekly basis and report to Head/Dean.

**OR**

**OPTION–II: As Major / Minor Courses:**

* + Deans / HODs shall identify a course of **03 credits** for each semester, well in advance (at-least 15 days prior to commencement of semester) and take approval from the Office of Dean, Academics / Pro-President, PU.
  + After approval, the respective Deans / HODs shall circulate a notice to all their respective students citing that the particular course will be conducted through MOOCs only and is compulsory for all respective students. The credits of this course will be counted against Major/Minor courses pertaining to that particular semester.
  + The tutor of the class shall monitor the progress (assignments, feedback, any problem etc.) on weekly basis and report to Head/Dean.
  + This is to be noted that if Deans / HODs decide to conduct any major/minor course in any semester through MOOCs, no offline course will be conducted against that.

**(b) Important points related to MOOCs at Poornima University**

* + Only one MOOC shall be allowed in a particular semester for the purpose of credit transfer in the beginning.
  + No attendance will be taken for MOOC courses.
  + Last period of T/T/S shall be taken for MOOC courses which shall be in self-study mode.
  + The method of assessments of MOOC such as assignments and examination are completely associated with that particular MOOC and no exam will be conducted by the department as well as by the Examination Cell.
  + The respective Dean / HOD must submit the detail of course i.e., code, name and credit of MOOC opted against that particular course in particular semester attached with highlighting in the related examination scheme of syllabus of that semester signed by BOS Convener / HoD and Dean of Faculty to the office of Pro-President before commencement of the classes.
  + SWAYAM will award a certificate to all the students passing the examination along with the credit earned. The center of examination for SWAYAM MOOCs will be finalized by SWAYAM. All the responsibility related to registration for MOOCs, timely submission of assignments, examinations etc. will be borne by the students only.
  + The list of registered students in MOOC along with name of course will be submitted to the Examination Cell by the Deans / HoDs before commencement of the classes.
  + Any student who would not be able to register/present/clear/pass the MOOC in the stipulated time, it is the choice of the student that he or she may register in next semester (odd or even) with MOOC again or appear as a back exam candidate of the University as per PU norms.
  + There will be no provision of re-evaluation of MOOC.
  + The scorecard and related certificate of MOOC along with a consolidated list of students with marks of assignment and final exam will be submitted to the examination cell by the concerned Dean / HOD for further process. It is also recommended that alteration/changes/scaling in marks obtained by the students in any MOOC will not be considered.
  + The exam registration fee of MOOC up to Max. INR 1000/- will be reimbursed to the student only after successful completion of the course in first attempt and submission of the fee receipt, score-card and certificate of the MOOC to the concerned department within stipulated time after declaration of the results.

**NOTE: This is to be noted that the procedure for getting approval from BOS, Faculty Board, Academic Council and BoM is to be followed as per regular process.**

**Attached Items:**

| Open Elective Booklet | Annexure-1 |
| --- | --- |
| Soft Skills Booklet | Annexure-2 |
| Value Added Course Booklet | Annexure-3 |

| **POORNIMA UNIVERSITY, JAIPUR**  **Faculty of Computer Science and Engineering** | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Name of Program : MCA General Duration: 2 years Total Credits: 82** | | | | | | | | | | | |
| **Teaching Scheme for Batch 2023-25** | | | | | | | | | | | |
| **Semester-I** | | | | | | | | | | | |
| **Course Code** | **Name of Course** | **Teaching Scheme** | | |  | | **Marks Distribution** | | | | **Credits** |
| **Lecture (L)** | **Tutorial (T)** | **Practical**  **(P)** | **SH** | | **IE** | **ESE** | | **Total** |
| **A.** | **Major (Core Courses)** | | | | | | | | | | |
| **A.1** | **Theory** |  |  |  |  | |  |  | |  |  |
| MCACSA1101 | Foundations of Mathematics | **3** |  |  | **1\*** | | **40** | **60** | | **100** | **3** |
| MCACCA1101 | Data Structures and Algorithms | **3** |  |  | **1\*** | | **40** | **60** | | **100** | **3** |
| MCACCA1102 | Python Programming | **3** |  |  | **1\*** | | **40** | **60** | | **100** | **3** |
| MCACCA1103 | Programming in C | **3** |  |  | **1\*** | | **40** | **60** | | **100** | **3** |
| MCACCA1104 | Linux Shell Programming | **3** |  |  | **1\*** | | **40** | **60** | | **100** | **3** |
| **A.2** | **Practical** |  |  |  |  | |  |  | |  |  |
| MCACCA1201 | Data Structure and Algorithm Lab |  |  | **2** |  | | **60** | **40** | | **100** | **1** |
| MCACCA1202 | Python Programming Lab |  |  | **2** |  | | **60** | **40** | | **100** | **1** |
| MCACCA1203 | Programming in C Lab |  |  | **2** |  | | **60** | **40** | | **100** | **1** |
| MCACCA1204 | Linux Shell Programming Lab |  |  | **2** |  | | **60** | **40** | | **100** | **1** |
| **B.** | **Minor Stream Courses/Department Elective** | | | | | | | | | | |
| **B.1** | **Theory** |  |  |  | |  |  |  | |  |  |
| MCAECA1111/ MCAECA1112/ MCAECA1113 | Software Engineering/  Computer Graphics and Multimedia/  Data Mining and Data Warehouse | **3** |  |  | | **1\*** | **40** | **60** | | **100** | **3** |
| **B.2** | **Practical** |  |  |  | |  |  |  | |  |  |
|  | - | - | - | - | |  | - | - | | - |  |
| **C** | **Multidisciplinary Courses** | | | | | | | | | | |
|  | - | **-** | - | - | |  | - | - | | - | **-** |
| **D** | **Ability Enhancement Courses (AEC)** | | | | | | | | | | |
| MULCHU1201 | Personality Development & Emotional Intelligence |  |  | **2** | |  | **60** | **40** | | **100** | **1** |
|  |  |  |  |  | |  |  |  | |  |  |
| **E** | **Skill Enhancement Courses (SEC)** | | | | | | | | | | |
| MULCSE1201 | Skill Enhancement Generic course –I |  |  | **2** | |  | **60** | **40** | | **100** | **1** |
| **F** | **Value Added Courses (VAC)** | | | | | | | | | | |
|  |  |  |  |  | |  |  | |  |  |  |
| **G** | **Summer Internship / Research Project / Dissertation** | | | | | | | | | | |
|  |  |  |  |  | |  |  |  | |  |  |
| **Total** | | **18** |  | **12** | | **6\*** |  |  | |  |  |
| **Total Teaching Hours** | | **30/36** | | | |  |  |  | |  | **24** |

SH: Supporting Hours

* Classes will be conducted fortnight on I,III and IV Monday

| **POORNIMA UNIVERSITY, JAIPUR**  **Faculty of Computer Science and Engineering** | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Name of Program : MCA General Duration: 2 years Total Credits: 82** | | | | | | | | | | | | | |
| **Teaching Scheme for Batch 2023-25** | | | | | | | | | | | | | |
| **Semester-II** | | | | | | | | | | | | | |
| **Course Code** | **Name of Course** | **Teaching Scheme** | | | | |  | **Marks Distribution** | | | | | **Credits** |
| **Lecture (L)** | **Tutorial (T)** | | **Practical**  **(P)** | | **SH** | **IE** | | **ESE** | | **Total** |
| **A.** | **Major (Core Courses)** | | | | | | | | | | | | |
| **A.1** | **Theory** |  |  | |  |  | |  | |  | |  |  |
| MCACCA2101 | Design & Analysis of Algorithms | 3 |  | |  | **1\*** | | 60 | | 40 | | 100 | **3** |
| MCACCA2102 | Data Base Management System | 3 |  | |  | **1\*** | | 60 | | 40 | | 100 | **3** |
| MCACCA2103 | OOPs with Java | 3 |  | |  | **1\*** | | 60 | | 40 | | 100 | **3** |
| MCACCA2104 | Web Technologies | 3 |  | |  | **1\*** | | 60 | | 40 | | 100 | **3** |
| **A.2** | **Practical** |  |  | |  |  | |  | |  | |  |  |
| MCACCA2201 | OOPs with Java Lab |  |  | | 2 |  | | 40 | | 60 | | 100 | **1** |
| MCACCA2202 | Design & Analysis of Algorithms Lab |  |  | | 2 |  | | 40 | | 60 | | 100 | **1** |
| MCACCA2203 | Data Base Management System Lab |  |  | | 2 |  | | 40 | | 60 | | 100 | **1** |
| MCACCA2204 | Web Technologies Lab |  |  | | 2 |  | | 40 | | 60 | | 100 | **1** |
| **B.** | **Minor Stream Courses/Department Elective** | | | | | | | | | | | | |
| **B.1** | **Theory** |  |  | |  |  | |  | |  | |  |  |
| MCAECA2111/ MCAECA2112/ MCAECA2113 | Computer Architecture/ Soft Computing/ Internet of Things | 3 |  | |  | **1\*** | | 60 | | 40 | | 100 | **3** |
| **B.2** | **Practical** |  |  | |  |  | |  | |  | |  |  |
|  |  | | | | | | | | | | | | |
| **C** | **Multidisciplinary Courses** | | | | | | | | | | | | |
| MCAEMC2121 | MOOC Course-I | 1 | - | | - | **1\*** | | **40** | | **60** | | **100** | **1** |
| **D** | **Ability Enhancement Courses (AEC)** | | | | | | | | | | | | |
| MULCHU2201 | Spoken English & Communication Skills I |  |  | | **2** |  | | **60** | | **40** | | **100** | **1** |
| **E** | **Skill Enhancement Courses (SEC)** | | | | | | | | | | | | |
| MULCSE2201 | Skill Enhancement Generic Course II |  |  | | **2** |  | | **60** | | **40** | | **100** | **1** |
| **F** | **Value Added Courses (VAC)** | | | | | | | | | | | | |
|  |  |  |  | |  | |  |  | | |  |  |  |
| **G** | **Summer Internship / Research Project / Dissertation** | | | | | | | | | | | | |
| MCACCA2401 | Industrial Training Seminar-I |  |  | 2 | | |  | | **60** | **40** | | **100** | **1** |
| **Total** | | **16** | - | **14** | | | **6\*** | |  |  | |  |  |
| **Total Teaching Hours** | | **30/36** | | | | |  | |  |  | |  | **23** |

SH: Supporting Hours

* Classes will be conducted fortnight on I,III and IV Monday

| **POORNIMA UNIVERSITY, JAIPUR**  **Faculty of Computer Science and Engineering** | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Name of Program : MCA General Duration: 2 years Total Credits: 82** | | | | | | | | | | | |
| **Teaching Scheme for Batch 2023-25** | | | | | | | | | | | |
| **Semester-III** | | | | | | | | | | | |
| **Course Code** | **Name of Course** | **Teaching Scheme** | | |  | **Marks Distribution** | | | | | **Credits** |
| **Lecture (L)** | **Tutorial (T)** | **Practical**  **(P)** | **SH** | **IE** | | **ESE** | **Total** | |
| **A.** | **Major (Core Courses)** | | | | | | | | | | |
| **A.1** | **Theory** |  |  |  |  |  |  | |  | |  |
| MCACCA3101 | Operating System | **3** |  |  | **1\*** | **40** | **60** | | **100** | | **3** |
| MCACCA3102 | Computer Networks | **3** | **-** | **-** | **1\*** | **40** | **60** | | **100** | | **3** |
| MCACCA3103 | Cloud Computing | **3** |  |  | **1\*** | **40** | **60** | | **100** | | **3** |
| MCACCA3104 | Artificial Intelligence | **3** | **-** | **-** | **1\*** | **40** | **60** | | **100** | | **3** |
| **A.2** | **Practical** |  |  |  |  |  |  | |  | |  |
| MCACCA3201 | Operating System Lab | - | - | **2** |  | **60** | **40** | | **100** | | **1** |
| MCACCA3202 | Computer Networks Lab |  |  | **2** |  | **60** | **40** | | **100** | | **1** |
| MCACCA3201 | Cloud Computing Lab | - | - | **2** |  | **60** | **40** | | **100** | | **1** |
| MCACCA3202 | Artificial Intelligence Lab |  |  | **2** |  | **60** | **40** | | **100** | | **1** |
| **B.** | **Minor Stream Courses/Department Elective** | | | | | | | | | | |
| **B.1** | **Theory** |  |  |  |  |  |  | |  | |  |
| MCAECA3111/ MCAECA3112/ MCAECA3113 | Big Data/ Blockchain Technology/ Mobile Application Development | **3** |  |  | **1\*** | **40** | **60** | | **100** | | **3** |
| **B.2** | **Practical** |  |  |  |  |  |  | |  | |  |
| **C** | **Multidisciplinary Courses** | | | | | | | | | | |
| MCAEMC3121 | MOOC Course-II | **1** | \_ | \_ | **1\*** |  |  | |  | | **1** |
| **D** | **Ability Enhancement Courses (AEC)** | | | | | | | | | | |
| MULCHU3201 | Spoken English & Communication Skills II | **-** | **-** | **2** |  | **60** | **40** | | **100** | | **1** |
| **E** | **Skill Enhancement Courses (SEC)** | | | | | | | | | | |
| MULCSE3201 | Skill Enhancement Generic Course –III | - | - | 2 |  | **60** | **40** | | | **100** | **1** |
| **F** | **Value Added Courses (VAC)** | | | | | | | | | | |
|  |  |  |  |  |  |  |  | |  | |  |
| **G** | **Summer Internship / Research Project / Dissertation** | | | | | | | | | | |
| MCACCA3401 | Industrial Training Seminar-II |  |  | 2 |  | **60** | **40** | | **100** | | **1** |
| **Total** | | **16** | - | **14** | 6\* |  |  | |  | |  |
| **Total Teaching Hours** | | **30/36** | | |  |  |  | |  | | **23** |

SH: Supporting Hours

* Classes will be conducted fortnight on I,III and IV Monday

| **POORNIMA UNIVERSITY, JAIPUR**  **Faculty of Computer Science and Engineering** | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Name of Program : MCA General Duration: 2 years Total Credits: 82** | | | | | | | | | | | | |
| **Teaching Scheme for Batch 2023-25** | | | | | | | | | | | | |
| **Semester-IV** | | | | | | | | | | | | |
| **Course Code** | **Name of Course** | | **Teaching Scheme** | | |  | **Marks Distribution** | | | | | **Credits** |
| **Lecture (L)** | **Tutorial (T)** | **Practical**  **(P)** | **SH** | **IE** | | **ESE** | | **Total** |
| **A.** | **Major (Core Courses)** | | | | | | | | | | | |
| **A.1** | **Theory** | |  |  |  |  |  | |  | |  |  |
|  | NIL | |  |  |  |  |  | |  | |  |  |
| **A.2** | **Practical** | |  |  |  |  |  | |  | |  |  |
|  | NIL | |  |  |  |  |  | |  | |  |  |
| **B.** | **Minor Stream Courses/Department Elective** | | | | | | | | | | | |
| **B.1** | **Theory** | |  |  |  |  | |  |  | |  |  |
|  | NIL | |  |  |  |  | |  |  | |  |  |
| **B.2** | **Practical** | |  |  |  |  | |  |  | |  |  |
|  | NIL | |  |  |  |  | |  |  | |  |  |
| **C** |  | **Multidisciplinary Courses** | | | | | | | | | | |
|  | NIL | |  |  |  |  | |  |  | |  |  |
| **D** |  | **Ability Enhancement Courses (AEC)** | | | | | | | | | | |
|  | NIL | |  |  |  |  | |  |  | |  |  |
| **E** |  | **Skill Enhancement Courses (SEC)** | | | | | | | | | | |
| MULCSE4201 | Skill Enhancement Generic Course- IV | |  |  | **2** |  | | **60** | **40** | | **100** | **1** |
|  |  | |  |  |  |  | |  |  | |  |  |
| **F** |  | **Value Added Courses (VAC)** | | | | | | | | | | |
|  |  | |  |  |  |  | |  | |  |  |  |
| **G** |  | **Summer Internship / Research Project / Dissertation** | | | | | | | | | | |
| MCACCA4501 | Project/Internship | |  |  | **22** |  | | **60** | **40** | | **100** | **11** |
| **Total** | | |  | **-** | **24** |  | | **-** | **-** | | **-** |  |
| **Total Teaching Hours** | | | **24** | | |  | |  |  | |  | **12** |

**Semester-I**

**Major (Core Courses)**

**Theory**



**COURSE OUTCOME:**

The student would be able to:

* Describe the basic concept of matrices and their various properties
* Obtain the solution of Eigen value and Eigen vectors and inverse of matrix using Cayley Hamilton theorem.
* Obtain important features of vector, Del operator and its various forms in gradient, divergence and curl.
* Solve the order and degree of differential equations and their solutions
* Analyze of complex number and their properties

1. **OUTLINE OF THE COURSE**

| **Unit No.** | **Title of the unit** | **Time required for the Unit (Hours)** |
| --- | --- | --- |
|  | **Matrix Theory** | **08** |
|  | **Eigen Values** | **07** |
|  | **Vector calculus** | **08** |
|  | **Differential Equation** | **08** |
|  | **Complex Algebra** | **07** |

1. **DETAILED SYLLABUS**

| **Unit** | **Unit Details** |
| --- | --- |
|  | **Matrix Theory** |
|  | * Introduction of Unit * Introduction to the matrix theory * Types of matrices, * Inverse of matrices, * Rank of matrices, * Solving system of linear equations. * Conclusion of Unit |
|  | **Eigen Values** |
|  | * Introduction of Unit * Eigen values and Eigen vectors, * Cayley-Hamilton Theorem (without proof) with application , * Diagonalization of matrices. * Conclusion of Unit |
|  | **Vector calculus** |
|  | * Introduction of Unit * Scalar and Vector quantity * Derivative of a vector function, Velocity and accelerations * Basic concepts of vectors, gradient, divergence and curl of a vector. * Conclusion of Unit |
|  | **Differential Equation** |
|  | * Introduction of Unit * Basic idea of differential equations * Degree and order of Differential equation * Variable separation, Homogeneous, * Linear equations and equations reducible to linear form * Exact Differential equation * Conclusion of Unit |
|  | **Complex Algebra** |
|  | * Introduction of Unit * Introduction to the complex algebra, complex numbers, * Geometrical representation of complex numbers, * Argand diagram, * De- Moirvre’s theorem * Conclusion of Unit |

1. **RECOMMENDED STUDY MATERIAL**

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
| --- | --- | --- | --- | --- |
|  | Higher Engineering Mathematics | Ramana B. V. | Latest | Tata McGraw – Hill |
|  | Engineering Mathematics | Babu Ram | Latest | Pearson |
|  | Higher Engineering Mathematics | B S Grewal | Latest | Khanna Publication |
| **Reference Book** | | | | |
|  | Higher Engineering Mathematics, Grewal B. S. and Grewal J. S, Khanna Publishers, New Delhi, Latest Edition | | | |
|  | Engineering Mathematics, Kreyszig Errwin, John Wiley& Sons, New York, Latest Edition | | | |
| Online Recourses | | | | |
|  | <https://www.tutorialspoint.com/mathematical-foundation-introduction> | | | |
|  | https://archive.nptel.ac.in/courses/111/104/111104071/ | | | |

**MAPPING OF CO VS PO/PSO**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | - | - | 2 |  | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | - | 2 |  | 1 | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | - | 2 | 2 | 1 | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | - | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - |

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development



**COURSE OUTCOME**

The student would be able:

* State various types of data structures and their uses according complexity.
* Illustrate the concept of searching and sorting techniques and apply on data.
* Analyze and design stack and queue data structure
* Design tree data structure for real life applications
* Design linked list and graph data structure for real life applications

1. **OUTLINE OF THE COURSE**

| **Unit No.** | **Title of the unit** | **Time required for the Unit (Hours)** |
| --- | --- | --- |
|  | **Complexity, Memory Allocation, and Arrays** | **08** |
|  | **Sorting Techniques and Linked List** | **07** |
|  | **Stack and Queue** | **08** |
|  | **Tree and its Applications** | **08** |
|  | **Graphs** | **08** |

1. **DETAILED SYLLABUS**

| **Unit** | **Unit Details** |
| --- | --- |
|  | **Complexity, Memory Allocation, Arrays, and Searching Techniques** |
|  | * Introduction of Unit * Classification of data structures: primitive and non-primitive * Applications of data structures * Time and space complexity of an algorithm * Asymptotic Notations * Memory allocation functions: Malloc(), Calloc(), free() and realloc() * Array Operations * Search Techniques: Sequential search * Iterative and Recursive methods-Binary search * Conclusion of Unit |
|  | **Sorting Techniques and Linked List** |
|  | * Introduction of Unit * Sorting: General background and definition, * Bubble sort, Selection sort and Insertion sort * Merge sort and Quick sort. * Radix Sorts * Complexity of Sorting Algorithms * Components of linked list, Representation of linked list, * Advantages and disadvantages of linked list. * Types of linked list: Singly linked list, doubly linked list, Circular linked list, * Operations on singly linked list: creation, insertion, deletion, search and display. * Conclusion of Unit |
|  | **Stack and Queue** |
|  | * Introduction of Unit * Stack – Definition, Array representation of stack, * Operations on stack: Infix, prefix and postfix notations, * Conversion of an arithmetic expression from Infix to postfix, * Applications of stacks. * Queue: Definition, Array representation of queue, * Types of queue: Simple queue, Circular queue, Double ended queue (deque), Priority queue, * Operations on all types of Queues * Conclusion of Unit |
|  | **Tree and its Applications** |
|  | * Introduction of Unit * Binary Trees - Operations on Binary trees * Binary Tree Representations - node representation, * Internal and external nodes, implicit array representation * Binary Search Tree (BST), * BST Insertions, Searching, Traversing and Deletions * Introduction to AVL Tree, Heap Tree and General trees * Conclusion of Unit |
|  | **Graphs** |
|  | * Introduction of Unit * Graphs - An application of graphs - Representation * Shortest path algorithm - a flow Problem * Dijkstra's algorithm - An application of scheduling * Graph Traversals * Minimum Spanning Tree- Prims and Kruskal’s Algorithm * Conclusion of Unit |

**C.RECOMMENDED STUDY MATERIAL**

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
| --- | --- | --- | --- | --- |
|  | Data Structures using C | Tanenbaum A.S., Langsam Y. Augestein M.J | Latest | Pearson Education |
|  | Data Structures and Program Design in C | Robert Kruse & ClovisL.Tondo | Latest | Prentice Hall |
| **Reference Book** | | | | |
|  | Weiss, "Data Structures and Algorithm Analysis in C", Addison Wesley, Second Edition, 2005. | | | |
|  | Y.Langsam, M.J.Augestein, A.M.Tanenbaum, "Data Structures Using C and C++", 2nd Edition,Prentice Hall of India, 2000. | | | |
| **Online Resources** | | | | |
|  | <https://nptel.ac.in/courses/106102064> | | | |
|  | <https://www.coursera.org/learn/data-structures> | | | |

**MAPPING OF CO VS PO/PSO**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | - | 2 | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | - | - | 2 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | - | 2 | 1 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | 3 | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | 3 | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - |

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

**Code: MCACCA1102 Python Programming 3 Credits [LTP: 3-0-0]**

**COURSE OUTCOME**

The student would be able to:

* Memorize Python basics and its data types.
* Use flow control to solve problems.
* Create functions to facilitate code reuse and flow control structure.
* Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.
* Identify the commonly used operations involving file systems and regular expressions.

1. **OUTLINE OF THE COURSE**

| **Unit No.** | **Title of the unit** | **Time required for the Unit (Hours)** |
| --- | --- | --- |
|  | **Introduction To Python and Data Types** | **08** |
|  | **Python Program Flow Control** | **07** |
|  | **Python Functions, Modules and Packages** | **08** |
|  | **Python String, List and Dictionary Manipulations** | **07** |
|  | **Python File Operation** | **08** |

1. **DETAILED SYLLABUS**

| **Unit** | **Unit Details** |
| --- | --- |
|  | **Introduction To Python and Data Types** |
|  | * Introduction of Unit * Installation and Working with Python * Understanding Python variables, Operators * Understanding python blocks * Declaring and using Numeric data types: int, float, complex * Using string data type and string operations * Defining list and list slicing * Use of Tuple data type * Conclusion of Unit |
|  | **Python Program Flow Control** |
|  | * Introduction of Unit * Conditional blocks using if, else and elif * Simple for loops in python * For loop using ranges, string, list and dictionaries * Use of while loops in python * Loop manipulation using pass, continue, break and else * Programming using Python conditional and loops block * Conclusion of Unit |
|  | **Python Functions, Modules And Packages** |
|  | * Introduction of Unit * Organizing python codes using functions * Organizing python projects into modules * Importing own module as well as external modules * Understanding Packages * Powerful Lamda function in python * Programming using functions, modules and external packages * Conclusion of Unit |
|  | **Python String, List and Dictionary Manipulations** |
|  | * Introduction of Unit * Building blocks of python programs * Understanding string in build methods * List manipulation using in build methods * Dictionary manipulation * Programming using string, list and dictionary in build functions. * Conclusion of Unit |
|  | **Python File Operation** |
|  | * Introduction of Unit * Reading various types of files in python * Writing log files in python * Understanding read functions, read(), readline() and readlines() * Understanding write functions, write() and writelines() * Manipulating file pointer using seek * Programming using file operations. * Conclusion of Unit |

1. **RECOMMENDED STUDY MATERIAL**

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
| --- | --- | --- | --- | --- |
|  | Fundamentals of Python: First Programs | Kenneth Lambert | Latest | Course Technology, Cengage Learning |
|  | Python: The Complete Reference | Martin Brown | Latest | McGraw Hill |
|  | Programming and Problem Solving with Python | Ashok Namdev Kamthane | Latest | McGraw Hill |
| **Reference Book** | | | | |
|  | Python Programming Fundamentals: A Beginner's Handbook, By Nischay kumar Hegde, Educreation Publishing | | | |
|  | Python Programming: An Introduction to Computer Science, By John M. Zelle, Jim Leisy Publication | | | |
| **Online Resources** | | | | |
|  | <https://www.tutorialspoint.com/python/index.htm> | | | |
|  | <https://nptel.ac.in/courses/106106145> | | | |

**MAPPING OF CO VS PO/PSO**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | - | 2 | 2 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | - | 2 | 1 |  | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | - | 2 | 2 | 1 | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | 3 | 2 | 1 | - | - | - | - | - | - | - | - | - | - | - |

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development



**COURSE OUTCOME**

Students will be able to:

* Illustrate the concept of data types, loops, functions, array, pointers, string, structures and files.
* Analyze the conditional and iterative statements to write C programs.
* Develop user defined functions to solve real life problems.
* Design C programs using pointers and to allocate memory using dynamic memory management functions.
* Apply programming concepts to compile and debug c programs to find solutions.

1. **OUTLINE OF THE COURSE**

| **Unit No.** | **Title of The Unit** | **Time required for the Unit (Hours)** |
| --- | --- | --- |
| **1.** | **Introduction to C Programming** | **7** |
| **2.** | **Decision Making & Looping** | **7** |
| **3.** | **Array, String and Functions** | **8** |
| **4.** | **Advance programming in C** | **8** |
| **5.** | **File handling & Additional features** | **8** |

1. **DETAILED SYLLABUS**

| **Unit** | **Unit Details** |
| --- | --- |
| **1.** | **Introduction to C Programming** |
|  | * Introduction of Unit * Introduction to computer-based problem solving, Program design and implementation issues- Flowcharts & Algorithms, Top-down design & stepwise refinement * Programming environment – Machine language, assembly language, high level languages, Assemblers, Compilers, and Interpreters. * Overview of C, Data Types, Constants & Variables, Literals, Operators & Expressions * Conclusion of Unit |
| **2.** | **Decision Making & Looping** |
|  | * Introduction of Unit * Decision making in C- if statement, if-else statement, Nested if statement, if else if Ladder, Switch case * Loop control in C – for loop, while loop, do-while loop * Control flow in C- break, continue and goto statement. * Conclusion of Unit |
| **3.** | **Array, String and Functions** |
|  | * Introduction of Unit * Array- 1D array, 2D array and dynamic array * Scope rules- Local & global variables, scope rules of functions * Functions-parameter passing, call by value and call by reference, calling functions with arrays, command line argument, recursion- basic concepts. * String – String in build function * Conclusion of the Unit |
| **4.** | **Advance programming in C** |
|  | * Introduction of Unit * Pointers- pointer expression, assignments, arithmetic, comparison, arrays of pointers, pointers to pointers, initializing pointers, pointers to functions, function retuning pointers. * Structures- Basics, declaring, referencing structure elements, array of structures, passing structures to functions, structure pointers, arrays and structures within structures, typedef. * Unions – Declaration, uses * Enumerated data-types * Conclusion of the Unit |
| **5.** | **File handling & Additional features** |
|  | * Introduction of Unit * File Handling – The file pointer, file accessing functions-fopen, fclose, putc, getc, fprintf, reading and writing into a file * Advance features- storage classes and dynamic memory allocation * C Preprocessor- #define, #include, #undef, Conditional compilation directives. * C standard library and header files: Header files, string functions, mathematical functions, Date and Time functions. * Conclusion of the Unit |

1. **RECOMMENDED STUDY MATERIAL**

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
| --- | --- | --- | --- | --- |
| 1. | Let us C, 6th Edition | Yashwant Kanetka | PBP Publication | Let us C, 6th Edition |
| 2. | Programming in ANSI C 3rd Edition, 2005 | Balaguruswamy | Tata McGraw Hill | Programming in ANSI C 3rd Edition, 2005 |
| **Reference Book** | | | | |
| 1. | The C programming Language, Richie and Kenninghan, BPB Publication,2004 | | | |
| 2. | Absolute beginner's guide to C, Greg M. Perry, Edition 2, Publisher: Sams Pub., 1994 | | | |
| **Online Resources** | | | | |
| 1. | <https://nptel.ac.in/courses/106104128> | | | |
| 2. | <https://www.tutorialspoint.com/cprogramming/index.htm> | | | |

**MAPPING OF CO VS PO/PSO**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | - | 3 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | - | 3 | 2 |  | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | - | 2 | 1 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | - | 2 | 2 | 1 | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | 2 | - | 1 | - | - | - | - | - | - | - | - | - | - | - |

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development



**COURSE OUTCOME**

Students will be able to:

* Use various Linux commands that are used to manipulate system operations at admin level and a prerequisite to pursue job as a Network administrator.
* Write Shell Programming using Linux commands.
* Design and write application to manipulate internal kernel level Linux File System.
* Develop IPC-API‘s that can be used to control various processes for synchronization.
* Develop Network Programming that allows applications to make efficient use of resources available on different machines in a network.

1. **OUTLINE OF THE COURSE**

| **Unit No.** | **Title of The Unit** | **Time required for the Unit (Hours)** |
| --- | --- | --- |
| **1.** | **Introduction to Linux and Linux utilities** | **07** |
| **2.** | **Introduction to shells** | **08** |
| **3.** | **Unix file structure** | **08** |
| **4.** | **Process and signals** | **07** |
| **5.** | **Inter process communication** | **07** |

1. **DETAILED SYLLABUS**

| **Unit** | | **Unit Details** |
| --- | --- | --- |
| **1.** | | **Introduction to Linux and Linux utilities** |
|  | | * Introduction of Unit * INTRODUCTION TO LINUX AND LINUX UTILITIES: A brief history of LINUX, architecture of LINUX, * features of LINUX, introduction to vi editor. * Linux commands- PATH, man, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, * rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip, file handling utilities, security by file permissions, * process utilities, disk utilities, networking commands, unlink, du, df, mount, umount, find, unmask, * ulimit, ps, w, finger, arp, ftp, telnet, rlogin.Text Processing utilities and backup utilities , tail, head , * sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, cpio * Conclusion of Unit |
| **2.** | | **Introduction to shells** |
|  | | * Introduction of Unit * Introduction to Shells: Linux Session, Standard Streams, Redirection, Pipes, Tee Command, * Command Execution, Command-Line Editing, Quotes, Command Substitution, Job Control, Aliases, * Variables, Predefined Variables, Options, Shell/Environment Customization. * Filters: Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, * Sorting, Translating Characters, Files with Duplicate Lines, Count Characters, Words or Lines, * Comparing Files. * Conclusion of Unit |
| **3.** | | **Unix file structure** |
|  | | * Introduction of Unit * Grep: Operation, grep Family, Searching for File Content. * Sed :Scripts, Operation, Addresses, commands, Applications, grep and sed. * UNIX FILE STRUCTURE: Introduction to UNIX file system, inode (Index Node), file descriptors, * system calls and device drivers. * Conclusion of Unit |
| **4.** | | **Process and signals** |
|  |  | * Introduction of Unit * PROCESS AND SIGNALS: Process, process identifiers, process structure: process table, viewing * processes, system processes, process scheduling, starting new processes: waiting for a process, * zombie processes, orphan process, fork, vfork, exit, wait, waitpid, exec, signals functions, unreliable * signals, interrupted system calls, kill, raise, alarm, pause, abort, system, sleep functions, signal sets. * File locking: creating lock files, locking regions, use of read and write with locking, competing locks,other lock commands, deadlocks. * Conclusion of Unit | |
|  | **5.** | **Inter process communication** | |
|  |  | * Introduction of Unit * INTER PROCESS COMMUNICATION: Pipe, process pipes, the pipe call, parent and child * processes, and named pipes: fifos, semaphores: semget, semop, semctl, message queues: msgget, * msgsnd, msgrcv, msgctl, shared memory: shmget, shmat, shmdt, shmctl, ipc status commands. * INTRODUCTION TO SOCKETS: Socket, socket connections - socket attributes, socket addresses, * socket, connect, bind, listen, accept, socket communications. * Awk and perl Programming: Awk pattern scanning and processing language, BEGIN and END patterns, Awk arithmetic and variables, Awk built in variable names and operators, arrays, strings, * functions, perl; the chop() function, variable and operators, $\_ and $. , Lists, arrays, regular expression and substitution, file handling, subroutines, formatted printing. * Conclusion of Unit | |

1. **RECOMMENDED STUDY MATERIAL**

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
| --- | --- | --- | --- | --- |
| 1. | Advanced Programming in the UNIX  Environment | W. Richard. Stevens | 3rd  edition | Pearson Education |
| 2. | Unix and shell Programming | [Stephen Kochan,](https://www.amazon.in/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=Stephen%2BKochan&search-alias=stripbooks) [Patrick](https://www.amazon.in/s/ref%3Ddp_byline_sr_book_2?ie=UTF8&field-author=Patrick%2BWood&search-alias=stripbooks)  [Wood](https://www.amazon.in/s/ref%3Ddp_byline_sr_book_2?ie=UTF8&field-author=Patrick%2BWood&search-alias=stripbooks) | Latest | Sams |
| **Reference Book** | | | | |
| 1. | Linux System Programming, Robert Love, O’Reilly, SPD. | | | |
| 2. | Advanced Programming in the UNIX environment, 2nd Edition, W.R.Stevens, Pearson Education. | | | |
| 3. | UNIX Network Programming, W.R. Stevens, PHI.  UNIX for Programmers and Users, 3rd Edition, Graham Glass, King Ables, Pearson Education | | | |
| **Online Resources** | | | | |
| 1. | https://[www.tutorialspoint.com/unix/shell\_scripting.htm](http://www.tutorialspoint.com/unix/shell_scripting.htm) | | | |
| 2. | https://[www.javatpoint.com/shell-scripting-tutorial](http://www.javatpoint.com/shell-scripting-tutorial) | | | |

**MAPPING OF CO VS PO/PSO**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | 3 | 3 | 2 |  | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | - | 2 | 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | - | 2 | 2 | 1 | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | - | 2 | 1 | - | - | - | - | - | - | - | - | - | - | - |

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

**Practical**



**Course Outcome:-**

Students will be able to:

* Develop skills to design and analyze simple linear and nonlinear data structures.
* Choose appropriate data structures to represent data items in real world.
* Implement and know the application of algorithms for sorting and searching and data items.
* Design data structures such as stacks, queues, hash tables, binary trees, search trees, heaps, graphs, and B-trees according to the requirement of software.
* Implement ADTs such as lists, graphs, search trees in C to solve problems

1. **LIST of PROGRAMS:**

| 1.    2.  3.  4.  5.  6.  7  8..  9.  10.  11.  12.  13.  14.  15.  16.  17.  18. | Write a program to implement the linear array operations.   1. Insert an integer into a given position in an array. 2. Deleting an integer from an array.   Write a program to perform the following operations on matrix using array: Addition, Multiplication, Transpose  Write a program to implement binary search.  Write a program to sort N numbers using selection sort.  Write a program to sort N numbers using bubble sort.  Write a program to sort N numbers using insertion sort.  Write a program to implement merge sort  Write a program to implement quick sort.  Write a program to implement stack operations  Write a program to implement queue operations  Creating a binary search tree and traversing it using in order, preorder and post order.  Perform deletion operation on binary search tree  Create singly linked list and perform following operations on it.  Inserting a node into a singly linked list.  Deleting a node from a singly linked list.  Searching a node from a singly linked list.  Create a doubly linked list and perform insertion and deletion operations  Write a program to implement BFS & DFS |
| --- | --- |

1. **RECOMMENDED STUDY MATERIAL**

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
| --- | --- | --- | --- | --- |
|  | Data Structures using C | Tanenbaum A.S., Langsam Y. Augestein M.J | Latest | Pearson Education |
|  | Data Structures and Program Design in C | Robert Kruse & ClovisL.Tondo | Latest | Prentice Hall |
| **Reference Books** | | | | |
|  | Weiss, "Data Structures and Algorithm Analysis in C", Addison Wesley, Second Edition, 2005. | | | |
|  | Y.Langsam, M.J.Augestein, A.M.Tanenbaum, "Data Structures Using C and C++", 2nd Edition,Prentice Hall of India, 2000. | | | |
| **Online Resources** | | | | |
|  | <https://nptel.ac.in/courses/106102064> | | | |
|  | <https://www.coursera.org/learn/data-structures> | | | |

**MAPPING OF CO VS PO/PSO**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | - | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | - | - | - |
| **CO2** | - | 3 | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | - |  | 1 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | - | 2 | 2 | 1 | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development



**Course Outcome:-**

Students will be able to:

* + Interpret the use of procedural statements like assignments, conditional statements, loops and function calls.
  + Infer the supported data structures like lists, dictionaries and tuples in Python.
  + Illustrate the application of matrices and regular expressions in building the Python programs.
  + Discover the use of external modules in creating excel files and navigating the file systems.
  + Describe the need for Object-oriented programming concepts in Python.

1. **LIST OF EXPERIMENTS:**

| 1 | Implement a sequential search |
| --- | --- |
| 2 | Create a calculator program |
| 3 | Explore string functions |
| 4 | Read and write into a file |
| 5 | Demonstrate usage of basic regular expression |
| 6 | Demonstrate use of advanced regular expressions for data validation. |
| 7 | Demonstrate use of List |
| 8 | Demonstrate use of Dictionaries |
| 9 | Create Comma Separate Files (CSV), Load CSV files into internal Data Structure |
| 10 | Write script to work like a SQL SELECT statement for internal Data Structure made in earlier exercise |
| 11 | Write script to work like a SQL Inner Join for an internal Data Structuremade in earlier exercise |
| 12 | Demonstrate Exceptions in Python |

1. **RECOMMENDED STUDY MATERIAL**

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
| --- | --- | --- | --- | --- |
| 1. | Fundamentals of Python: First Programs | Kenneth Lambert | Latest | Course Technology,  Cengage Learning |
| 2. | Python: The Complete Reference | Martin Brown | Latest | McGraw Hill |
| 3. | Programming and Problem Solving with Python | Ashok Namdev Kamthane | Latest | McGraw Hill |
| **Reference Book** | | | | |
| 1. | Python Programming Fundamentals: A Beginner's Handbook, By Nischay kumar Hegde, Educreation Publishing | | | |
| 2. | Python Programming: An Introduction to Computer Science, By John M. Zelle, Jim Leisy Publication | | | |
| **Online Resources** | | | | |
| 1. | https://[www.tutorialspoint.com/python/index.htm](http://www.tutorialspoint.com/python/index.htm) | | | |
| 2. | <https://nptel.ac.in/courses/106106145> | | | |

**MAPPING OF CO VS PO/PSO**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | - | - | 2 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | 2 | - | - | 3 | 2 | - | - | - | - | - | - | - | - | - | - |
| **CO4** | 2 | 3 | 1 | 1 | 2 | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | - | 2 | 1 |  | - | - | - | - | - | - | - | - | - | - |

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development



**Course Outcome:-**

Students will be able to:

* Demonstrate concept of functional hierarchical code organization.
* Work with textual information, characters and strings
* Implement file handling concepts
* Implement real time applications using the power of C language features.
* Handle possible errors during program execution.

1. **LIST OF EXPERIMENTS:**

| 1 | Given the values of the variables x, y and z, write a program to rotate their values such that x has the value of y, y has the value of z, and z has the value of x |
| --- | --- |
| 2 | Write a program that reads a floating point number and then displays the right-most digit of the integral part of the number. |
| 3 | Write a C program to calculate the sum of digits of given number. |
| 4 | Program to find largest and smallest number from four given number. |
| 5 | Program to find whether a year is leap or not. |
| 6 | Write a C program in which enter any number by the user and perform the operation of Sum of digits of entered number. |
| 7 | Write a C Program to convert Decimal number to Binary number. |
| 8 | Find the sum of this series up to n terms 1+2+3+4+5+6+……….. |
| 9 | Program to print Armstrong’s numbers from 1 to 100. |
| 10 | Write a program to convert years into Minute, Hours, Days, Months, Seconds using switch () statements |
| 11 | Write a C menu driven program |
| 12 | Write a program to generate the various pattern of numbers |
| 13 | Write a C Program to print the reverse of an integer number |
| 14 | Write a C program to perform the factorial of given number |
| 15 | Write a C program in which a function prime that returns 1 if its argument is a prime and return zero otherwise. |
| 16 | Write a C program to calculate factorial of a number using recursion |
| 17 | Write a C program in which enter 10 elements by the user and perform the operation of sorting in ascending order |
| 18 | Write a C program to perform to perform Matrix addition and multiplication operations |
| 19 | Write a program to determine the length of the string and find its equivalent ASCII codes. |
| 20 | Write a program to delete all the occurrences of the vowels in a given text. Assume that the text length will be of one line |
| 21 | Write a program to maintain the library record for 100 books with book name, author’s name, and edition, year of publishing and price of the book |

1. **RECOMMENDED STUDY MATERIAL**

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
| --- | --- | --- | --- | --- |
|  | Let us C, 6th Edition Yashwant Kanetka PBP Publication | Yashwant Kanetkar | 6th Edition | PBP Publication |
|  | The C programming Language | 2. Richie and Kenninghan | 2. 2nd Edition 2004 | PBP Publication,2004 |
|  | Programming in ANSI C | Balaguruswamy Tata McGraw Hill | 3. 3rd Edition, 2005 | Tata McGraw Hill |
| **Reference Book** | | | | |
|  | The C programming Language Richie and Kenninghan PBP Publication,2004 | | | |
|  | Programming in ANSI C 3rd Edition, 2005 Balaguruswamy Tata McGraw Hill | | | |
| **Online Resources** | | | | |
|  | <https://www.programiz.com/c-programming/examples> | | | |
|  | <https://www.w3resource.com/c-programming-exercises> | | | |

**MAPPING OF CO VS PO/PSO**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | - | 3 | 2 |  | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | - | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | 3 | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | - | 2 | 1 | - | - | - | - | - | - | - | - | - | - | - |

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development



**COURSE OUTCOME**

Students will be able to:

* + Get the basic set of commands and utilities in Linux/UNIX systems
  + Able to work on VI editor and its commands
  + Apply the concept of shell script to do basic programming.
  + Implement Shell script to perform conditional statements
  + Implement Shell script to perform Looping statements.

**A. LIST OF EXPERIMENTS:**

| 1 | Study of Linux basic commands: cal, date, echo, printf, bc, script, mailx, passwd, who, uname, tty,  stty, pwd, cd, mkdir, rmdir, ls, cat, cp, rm, mv, more, file, wc, od, cmp,comm, diff, chmod, vi. |
| --- | --- |
| 2 | Study of vi editor |
| 3 | Write a Script to print “hello world” |
| 4 | Write a script to create function. |
| 5 | Write a script to implement local variables. |
| 6 | Write a script to implement if...else. |
| 7 | Write a script to study for, while and until |
| 8 | Write a script that finds the prime factors of a given number. |
| 9 | 1. Write a script to check if the two strings are same or not. 2. Write a shell script to check the given number is Odd/Even |
| 10 | Write a script that will print a message “Good Morning” or “Good Afternoon” according to the user login time |
| 11 | Linux Commands: cmp, find, grep, od, tar, ps, df, du, finge, kill, nice, nonhup, sleep, test, umask, who, cal, tee, expr, uname, fsck, xargs. Filters for stream handling features of the shell for input and  output. E.g. pr, head, tail, cut, paste, sort, nl, uniq, tr. |
| 12 | 1. Write a shell script to show the Palindrome number 2. Write a script to show the Factorial value of the given value |

**C. RECOMMENDED STUDY MATERIAL**

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
| --- | --- | --- | --- | --- |
| 1 | Advanced Programming in the UNIX  Environment | W. Richard. Stevens | 3rd | P Pearson Education,  New Delhi, India |
| 2 | Introduction to Unix and Shell Programmin | M.G  Vrenkateshmurthy | Latest | Pearson |

| **Reference Book** | |
| --- | --- |
| 1 | Linux System Programming, Robert Love, O’Reilly, SPD. |
| **Online Resources** | |
| 1 | [https://www.udemy.com/course/linux-shell-scripting-](https://www.udemy.com/course/linux-shell-scripting-free/?LSNPUBID=JVFxdTr9V80&ranEAID=JVFxdTr9V80&ranMID=39197&ranSiteID=JVFxdTr9V80-UsJPAU2ZeiS.IB5HWdi8Ug&utm_medium=udemyads&utm_source=aff-campaign)  [free/?LSNPUBID=JVFxdTr9V80&ranEAID=JVFxdTr9V80&ranMID=39197&ranSiteID=JVFxdTr9V80-](https://www.udemy.com/course/linux-shell-scripting-free/?LSNPUBID=JVFxdTr9V80&ranEAID=JVFxdTr9V80&ranMID=39197&ranSiteID=JVFxdTr9V80-UsJPAU2ZeiS.IB5HWdi8Ug&utm_medium=udemyads&utm_source=aff-campaign) [UsJPAU2ZeiS.IB5HWdi8Ug&utm\_medium=udemyads&utm\_source=aff-campaign](https://www.udemy.com/course/linux-shell-scripting-free/?LSNPUBID=JVFxdTr9V80&ranEAID=JVFxdTr9V80&ranMID=39197&ranSiteID=JVFxdTr9V80-UsJPAU2ZeiS.IB5HWdi8Ug&utm_medium=udemyads&utm_source=aff-campaign) |
| 2 | <https://www.youtube.com/watch?v=cQepf9fY6cE> |

**MAPPING OF CO VS PO/PSO**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | - | 3 | 2 |  | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | - | 2 | 1 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | - | 2 | 2 | 1 | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | - | 2 | 1 | - | - | - | - | - | - | - | - | - | - | - |

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

**Department Elective**

**Theory**



**COURSE OUTCOME**

After completion of the course, the students will be able to:

* Analyze software process models including traditional and evolutionary models
* Design applicable solutions in one or more application domains using software design methods that integrate planning and design process
* Draw UML diagram using basic behavioral modeling and advanced structured modeling
* Deliver quality software products by possessing the effective analytical skills by applying the testing processes
* Apply new software models, techniques and technologies to design a software project for the growth of the society

1. **OUTLINE OF THE COURSE**

| **Unit No.** | **Title of The Unit** | **Time required for the Unit (Hours)** |
| --- | --- | --- |
|  | **Software Engineering Fundamentals** | **07** |
|  | **Software Project Planning** | **08** |
|  | **Software Design and UML** | **08** |
|  | **Software Testing** | **07** |
|  | **AGILE Project Management** | **07** |

**B.DETAILED SYLLABUS**

| **Unit** | **Unit Details** |
| --- | --- |
|  | **Software Engineering Fundamentals** |
|  | * Introduction of Unit * Software Engineering - A layered Technology, The importance of software, software myths, software engineering paradigms * Software Process Models: Linear Sequential Model, Prototyping Model, RAD Model * Evolutionary Software Process Models: Incremental Model, Spiral Model Component Assembly Model, Formal Methods, Fourth-Generation Techniques. * Conclusion of Unit |
|  | **Software Project Planning** |
|  | * Introduction of Unit * Software Project Planning, Size Estimation, Cost Estimation, Models, Static, single variable models, Static, Multivariable Models, COCOMO, The Putnam Resource Allocation Model, * Risk Identification and Projection: RMMM, Project scheduling and Tracking. * Software Design Process, Design Principles, and Design Concepts: Effective Modular Design, Design Heuristics, Design Documentation, * Design Methods: Data Design, Architectural Design, Interface Design, Human Computer Interface Design, Procedural Design. Case Study for Design of any Application Project. * Conclusion of Unit |
|  | **Software Design and UML** |
|  | * Introduction of Unit * Unified Modeling Language, Basic structures and modeling classes, common modeling techniques, relationships, common mechanism, class diagrams. * Advanced structured modeling, advanced classes and relationships, interfaces, types and roles, instances and object diagram. * Basic behavioral Modeling: Use cases, use case diagrams, Interaction diagram, Activity diagrams, state chart diagrams, component diagrams, deployment diagrams, patterns and frame works. * Conclusion of Unit |
|  | **Software Testing** |
|  | * Introduction of Unit * S/W Testing Fundamentals, Unit, integration, system testing, black box and white box testing Incremental testing, formal proof of correctness, software matrix * Automated Testing: Introduction to Automated testing, Software testing with automated tools * Conclusion of Unit |
|  | **AGILE Project Management** |
|  | * Introduction of Unit * Agile Programming- Introduction, Flavors of Agile Development, Agile Manifesto, Refactoring Techniques, Limitations of the Agile Process. * Agile Modeling: Introduction, Agile Modeling – Principles, Comparing Waterfall and Agile Modeling * Scrum Methodology- The roles of Scrum, Project Artifacts, Meetings, Advantages of Scrum. * Conclusion of Unit |

**B.RECOMMENDED STUDY MATERIAL**

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
| --- | --- | --- | --- | --- |
|  | Software Engineering: A Practitioner‟s Approach | Roger S Pressman, Bruce R Maxim | 8th Edition | TMH. |
|  | Software engineering | Ian Sommerville | 9th Edition | Addison Wesley Longman |
| **Reference Book** | | | | |
|  | Grady Booch, James Rumbaugh, IvarJacobson.,” The Unified Modeling Language User Guide”, 2nd Edition, 2017 | | | |
|  | James Rumbaugh. MichealBlaha “Object oriented Modeling and Design with UML”, 2011 | | | |
|  | Ali Behforooz, Hudson, “Software Engineering Fundamentals”, Oxford, 2009 | | | |
|  | Charles Ritcher, “Designing Flexible Object Oriented systems with UML”, TechMedia , 2008 | | | |
| **Online Resources** | | | | |
|  | <https://nptel.ac.in/courses/106105182> | | | |
|  | <https://www.w3schools.in/sdlc/software-development-life-cycle-sdlc> | | | |

**MAPPING OF CO VS PO/PSO**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | 3 | - | - |  | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | - | 2 | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | 2 | 3 | - | 2 | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | 2 | 3 | 2 |  | - | - | - | - | - | - | - | - | - | - |

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development



**COURSE OUTCOME**

The student would be able:

* State the basics of computer graphics, different graphics systems and applications of computer graphics.
* Identify the different color models.
* Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
* Use of geometric transformations on graphics objects and their application in composite form.
* Extract scene with different clipping methods and its transformation to graphics display device.

1. **OUTLINE OF THE COURSE**

| **Unit No.** | **Title of the unit** | **Time required for the Unit (Hours)** |
| --- | --- | --- |
|  | **Introduction to computer graphics & graphics systems** | **08** |
|  | **Scan Conversion Points, Lines& Circles** | **07** |
|  | **2D & 3D Transformations** | **08** |
|  | **Viewing & Hidden Surfaces Detections** | **07** |
|  | **Introduction to Multimedia** | **08** |

**B.DETAILED SYLLABUS**

| **Unit** | **Unit Details** |
| --- | --- |
|  | **Introduction to computer graphics & graphics systems** |
|  | * Introduction of Unit * Overview of computer graphics * Representing pictures * Preparing, presenting & interacting with pictures for presentations * Visualization & image processing * RGB color model, direct coding * Raster scan display * Conclusion of Unit |
|  | **Scan Conversion Points, Lines& Circles** |
|  | * Introduction of Unit * Concepts of Pixels, Resolution, Persistence, Aspect Ratio * Line drawing algorithms; DDA algorithm, Bresenham’s line algorithm, * Circle generation algorithm, Ellipse generating algorithm * Scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm * Conclusion of Unit |
|  | **2D & 3D Transformations** |
|  | * Introduction of Unit * 2D-Translation, 2D-Rotation, 2D-Scaling * 2D-Matrix representations & homogeneous coordinates, * Transformations between coordinate systems * Reflection shear * 3D-Translation, 3D-Rrotation, 3D-Scaling * Conclusion of Unit |
|  | **Viewing & Hidden Surfaces Detections** |
|  | * Introduction of Unit * Window to viewport * Co-ordinate transformation, clipping operations * Point clipping, line clipping, * Clipping circles, polygons & ellipse * Z-buffer algorithm, Back face detection, BSP tree method, * Hidden line elimination * Conclusion of Unit |
|  | **Introduction to Multimedia** |
|  | * Introduction of Unit * Concepts, uses of multimedia, hypertext and hypermedia. * Image, video and audio standards * Digital audio, MIDI, processing sound, sampling, compression * MPEG compression standards, compression through spatial and temporal redundancy * Inter-frame and intra-frame compression * Animation: types, techniques, key frame animation * Virtual Reality concepts. * Conclusion of Unit |

**C.RECOMMENDED STUDY MATERIAL**

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
| --- | --- | --- | --- | --- |
|  | Computer Graphics | Donald Hearn and Pauline Baker M | Latest | Prentice Hall, New Delhi |
|  | Procedural Elements of Computer Graphics | Rogers | Latest | Tata McGraw Hill |
| **Reference Book** | | | | |
|  | Foley, Vandam, Feiner and Hughes, ―Computer Graphics: Principles and Practice‖, 2nd Edition, Pearson Education, | | | |
|  | Jeffrey McConnell, Computer Graphics: Theory into Practice, Jones and Bartlett Publishers | | | |
|  | Andleigh, P. K and Kiran Thakrar, Multimedia Systems and Design, PHI, | | | |

| **Online Resources** | |
| --- | --- |
| 1 | <https://nptel.ac.in/courses/106106090> |
| 2 | https://www.javatpoint.com/computer-graphics-tutorial |

**MAPPING OF CO VS PO/PSO**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | - | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | - | 3 | - | 2 | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | - | 3 | - | 2 | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development



**COURSE OUTCOME**

Students will be able to

* Design a data warehouse system and perform business analysis with OLAP tools.
* Apply suitable pre-processing and visualization techniques for data analysis
* Apply frequent pattern and association rule mining techniques for data analysis and apply appropriate classification and clustering techniques for data analysis
* Design a data mart or data warehouse for any organization
* Extract knowledge using data mining techniques and Adapt to new data mining tools.

1. **OUTLINE OF THE COURSE**

| **Unit No.** | **Title of the unit** | **Time required for the Unit (Hours)** |
| --- | --- | --- |
|  | **Data Warehousing, Business Analysis And On-Line Analytical Processing (Olap)** | **08** |
|  | **Data Mining – Introduction** | **07** |
|  | **Data Mining – Frequent Pattern Analysis** | **08** |
|  | **Classification And Clustering** | **07** |
|  | **Weka Tool** | **08** |

**B.DETAILED SYLLABUS**

| **Unit** | **Unit Details** |
| --- | --- |
|  | **DATA WAREHOUSING, BUSINESS ANALYSIS AND ON-LINE ANALYTICAL PROCESSING (OLAP)** |
|  | * Introduction of Unit * Basic Concepts – Data Warehousing Components * Building a Data Warehouse * Database Architectures for Parallel Processing - Parallel DBMS Vendors – Multidimensional Data Model * Data Warehouse Schemas for Decision Support, Concept Hierarchies – * Characteristics of OLAP Systems * Typical OLAP Operations, OLAP and OLTP. * Conclusion of Unit |
|  | **DATA MINING – INTRODUCTION** |
|  | * Introduction to Data Mining Systems * Knowledge Discovery Process – Data Mining Techniques – Issues – applications * Data Objects and attribute types, Statistical description of data * Data Preprocessing – Cleaning, Integration, Reduction, Transformation and discretization * Data Visualization, Data similarity and dissimilarity measures. * Conclusion of Unit |
|  | **DATA MINING – FREQUENT PATTERN ANALYSIS** |
|  | * Introduction of Unit * Mining Frequent Patterns, Associations and Correlations * Mining Methods- Pattern Evaluation Method * Pattern Mining in Multilevel, Multi Dimensional Space * Constraint Based Frequent Pattern Mining, * Classification using Frequent Patterns * Conclusion of Unit |
|  | **CLASSIFICATION AND CLUSTERING** |
|  | * Introduction of Unit * Decision Tree Induction * Bayesian Classification – Rule Based Classification – Classification by Back Propagation – * Support Vector Machines –– Lazy Learners – Model Evaluation and Selection- * Techniques to improve Classification Accuracy. * Clustering Techniques – Cluster analysis-Partitioning Methods – Hierarchical Methods – Density Based Methods – Grid Based Methods – * Evaluation of clustering – Clustering high dimensional data- Clustering with constraints, Outlier analysis-outlier detection methods. * Conclusion of Unit |
|  | **WEKA TOOL** |
|  | * Introduction of Unit * Datasets – Introduction, Iris plants database, Breast cancer database, Auto imports database – * Introduction to WEKA, * The Explorer – Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms, Association–rule learners. * Conclusion of Unit |

**C.RECOMMENDED STUDY MATERIAL**

| **S. No** | **Text Books:** | **Author** | **Edition** | | **Publication** |
| --- | --- | --- | --- | --- | --- |
|  | Data Mining Concepts and Techniques, | Jiawei Han and Micheline Kamber | Third Edition | Elsevier, 2012 | |
| **Reference Book** | | | | | |
|  | Alex Berson and Stephen J.Smith, ―Data Warehousing, Data Mining & OLAP‖, Tata McGraw – Hill Edition, 35th Reprint 2016. | | | | |
|  | K.P. Soman, Shyam Diwakar and V. Ajay, ―Insight into Data Mining Theory and Practice, Eastern Economy Edition, Prentice Hall of India, 2006. | | | | |
|  | Ian H.Witten and Eibe Frank, ―Data Mining: Practical Machine Learning Tools and Techniques, Elsevier, Second Edition. | | | | |
| **Online Resources** | | | | | |
| 1 | https://www.tutorialspoint.com/data\_mining/index.htm | | | | |
| 2 | <https://nptel.ac.in/courses/106105174> | | | | |

**MAPPING OF CO VS PO/PSO**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | - | 2 | - | 2 | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | - | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

**Ability Enhancement Courses (AEC)**



**Course Outcomes:**

On successful completion of the course the learners will be able to

* Realize the art of Power Dressing and making a great first impression by polishing their Corporate/ Business manners.
* Enhance their self-esteem, confidence and assertive behaviour to handle difficult situations with grace, style, and professionalism.
* Apply the understanding of harmony in existence in their profession and lead an ethical life.
* Recognize and use emotional intelligence to create and maintain productive workplace relationships and team environment.
* Apply collaborative, inclusive and creative communication skills.

1. **OUTLINE OF THE COURSE**

| **Unit No.** | **Title of the Unit** | **Time required for the Unit (Hours)** |
| --- | --- | --- |
| **1** | **Personal Grooming & Attitude Building** | **6** |
| **2** | **Mentoring & Interpersonal Skills** | **6** |
| **3** | **Conflict & Stress Management** | **7** |
| **4** | **Social Skills Development** | **7** |
| **5** | **Self Esteem Enhancement** | **2** |

1. **DETAILED SYLLABUS**

| **Unit** | **Unit Details** |  |
| --- | --- | --- |
|  | **Personal Grooming & Attitude Building** | **Method** |
|  | * Introduction of the Course & the topic * Impactful Personality * Attitude Building Activities * Self-Grooming & Dressing Sense * Time Management * Team Building Activities * Conclusion & Summary of the Unit | * Theory/Practical * Theory * Practical * Practical * Practical * Practical * Theory/ Practical |
|  | **Mentoring & Interpersonal Skills** |  |
|  | * Introduction of the topic * Mentoring: Coaching one or more people * Leadership: Leading and assisting others by example * Problem Solving: Resolving personal, group, and business conflict  Communicating with Confidence  * Conclusion & Summary of the Unit | * Theory/Practical * Practical * Practical * Practical * Practical * Theory/ Practical |
|  | **Conflict & Stress Management** |  |
|  | * Introduction of the topic * The role of communication in conflict/stress and conflict/stress management processes. * Analyse the components of conflict/stress that lead to constructive or destructive communication patterns. * Recommend effective conflict/stress management communication for a given situation * Practice Sessions. * Conclusion & Summary of the Unit | * Theory/Practical * Theory/Practical * Theory/Practical * Theory/Practical * Practical * Theory/Practical |
|  | **Social Skills Development** |  |
|  | * Introduction of the topic * Listening Skills activities * Social Problem Solving * Being a part of the group and expression of feelings * Conclusion & Summary of the Unit | * Theory/Practical * Practical * Practical * Practical * Theory/Practical |
|  | **Self Esteem Enhancement** |  |
|  | * Introduction of the topic * Face your Fear & Speak with Confidence * Case Study/Class Survey * Personal Growth & Development Session * Conclusion & Summary of the Unit | * Theory/Practical * Practical * Practical * Practical * Theory/Practical |

**Skill Enhancement Courses (SEC)**



**COURSE OUTCOMES:**

Students will be able to:

CO.1: Enhance problem solving skills.

CO.2: Prepare for various public and private sector exams & placement drives

CO.3: Communicate effectively & appropriately in real life situation.

CO.4: Improve verbal ability skill among students.

CO.5: Enrich their knowledge and to develop their logical reasoning thinking ability.

| **LIST OF ACTIVITIES** | |
| --- | --- |
| 1 | SMART Goals,Goal Setting (IKIGAI), Wheel of Satisfaction, Exchanging pleasantries |
| 2 | Root Words, Prefix-Suffix, Antonyms, Synonyms & Analogies, Sentence Correction-1 |
| 3 | Numbers,Relations & Functions, HCF & LCM, Average & Divisibility |
| 4 | Resume Tips & Resume Review |
| 5 | How to win friends & Influence people, Sentence Correction-2 |
| 6 | Series & Progressions |
| 7 | Number Series & Letter Series, Crypto-arithmetic, SWOT/SWOC |
| 8 | Percentage, Profit & Loss, Ratio Proportion, CI & SI |
| 9 | Mixtures and Allegations, Short Cut Tricks, Seating Arrangement, Sequencing & Ranking |
| 10 | Surds & Indices, Problem on ages,Solving Equations - Quadratic & Linear |
| 11 | Time & Distance, Boats & Streams, Clocks and Calendars |
| 12 | GD, Practice of GD, Reading and Comprehension |

**Semester-II**



**COURSE OUTCOME**

After completion of the course, the students will be able to:

* Analyze the asymptotic performance of algorithms
* Choose appropriate algorithm design paradigm like Divide and Conquer and Greedy for solving engineering problems
* Apply Dynamic Programming and Backtracking to solve engineering problems
* Solve common engineering design problems using Randomize algorithms
* Evaluate arithmetic expressions using parallel model.

1. **OUTLINE OF THE COURSE**

| **Unit No.** | **Title of The Unit** | **Time required for the Unit (Hours)** |
| --- | --- | --- |
|  | **Introduction to Analysis of Algorithms** | **07** |
|  | **Divide and Conquer and Greedy Methods** | **08** |
|  | **Dynamic Programming and Backtracking** | **08** |
|  | **Randomized Algorithms** | **07** |
|  | **Parallel Models** | **07** |

**B.DETAILED SYLLABUS**

| **Unit** | **Unit Details** |
| --- | --- |
|  | **Introduction to Analysis of Algorithms** |
|  | * Introduction of Unit * Algorithm definition and specification, Design of Algorithms, and Complexity of Algorithms, Asymptotic Notations, Growth of function, Recurrences, * Performance analysis * Elementary Data structures:- stacks and queues, trees, dictionaries, priority queues –sets and disjoint set union, graphs, basic traversal and search techniques. * Conclusion of Unit |
|  | **Divide and Conquer and Greedy Methods** |
|  | * Introduction of Unit * Divide and conquer:- General method, binary search, merge sort, Quick sort, * The Greedy method:-General method, knapsack problem, minimum cost spanning tree, single source shortest path. * Conclusion of Unit |
|  | **Dynamic Programming and Backtracking** |
|  | * Introduction of Unit * Dynamic Programming, general method, multistage graphs, all pair shortest path, optimal binary search trees, 0/1 Knapsack, traveling salesman problem, flow shop scheduling. * Backtracking:- general method, 8-Queens problem, sum of subsets, graph coloring, Hamiltonian cycles, knapsack problem, Branch and bound:- The Method, 0/1 Knapsack problem, traveling salesperson. * Conclusion of Unit |
|  | **Randomized Algorithms** |
|  | * Introduction of Unit * Randomized Algorithms: Las Vegas algorithms, Monte Carlo algorithms, randomized algorithm for Min-Cut, randomized algorithm for 2- SAT. Problem definition of Multicommodity flow, Flow shop scheduling and Network capacity assignment problems. * Conclusion of Unit |
|  | **Parallel Models** |
|  | * Introduction of Unit * Parallel models:-Basic concepts, performance Measures, * Parallel Algorithms: Parallel complexity, Analysis of Parallel Addition, Parallel Multiplication and division * Parallel Evaluation of General Arithmetic Expressions, First-Order Linear recurrence. * Conclusion of Unit |

1. **RECOMMENDED STUDY MATERIAL**

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
| --- | --- | --- | --- | --- |
|  | Design and analysis of Algorithms | Aho A.V , J.D Ulman | Third Edition | Addison Wesley |
|  | Design and Analysis of Algorithms | Dave and Dave | Second Edition | Pearson |
| **Reference Book** | | | | |
|  | Introduction to Algorithms, Cormen, Leiserson, Rivest, Prentice Hall of India | | | |
|  | Fundamental of Computer algorithms, Horowitz and Sahani | | | |
| **Online Resources** | | | | |
|  | <https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm> | | | |
|  | <https://nptel.ac.in/courses/106106131> | | | |

**MAPPING OF CO VS PO/PSO**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | - | - | 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | 3 | - | - | - | - | - | - |  | - | - | - | - | - | - | - |
| **CO3** | 2 | 3 | 2 | - | - | - | - |  | - | - | - | - | - | - | - |
| **CO4** | - | 2 | 3 | 2 | - | - | - | - |  | - | - | - | - | - | - |
| **CO5** | - | - | - | - |  | - | - | - |  | - | - | - | - | - | - |

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development



**Course Outcome**

Students will be able to

* Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models.
* Identify basic database storage structures and access techniques such as file organizations, indexing methods including B‐tree, and hashing.
* Learn and apply structured query language (SQL) for database definition and database manipulation.
* Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
* Learn various transaction processing, concurrency control mechanisms and database protection mechanisms.

1. **OUTLINE OF THE COURSE**

| **Unit No.** | **Title of the unit** | **Time required for the Unit  (Hours)** |
| --- | --- | --- |
| **1** | **Introduction to Database Management System** | **7** |
| **2** | **RDBMS** | **7** |
| **3** | **SQL** | **7** |
| **4** | **PL/SQL** | **8** |
| **5** | **Oracle, Trigger and wrapping** | **7** |

1. **DETAILED SYLLABUS**

| **Unit** | **Unit Details** |
| --- | --- |
| **1.** | **Introduction to Database Management System** |
|  | * Introduction to Database Management System * Characteristics of database approach * Advantages of DBMS * Schemas: Three schema architecture - The external level, the conceptual level and the internal level. * Data Independence * Database languages and Interfaces * Roles of Database Administrator * Introduction to Data Models (Hierarchical, Network and Relation) * Entity type, Entity sets, Attributes and keys. * The ER Model: ER Diagram & Database design with the ER Model * Conclusion of the Unit |
| **2.** | **RDBMS** |
|  | * Introduction to Distributed Database * Classification of DBMS * Introduction to RDBMS * Relational Model –Concepts * Relational operations (Insert, delete, update, select, project, rename, union, intersection, minus, Join, division) * Transactions and ER mapping Examples * Normalization of RDBMS (1NF, 2NF, 3NF and 4NF) and inference rules. * Conclusion of the Unit |
| **3.** | **SQL** |
|  | * Introduction to Unit * DBMS v/s RDBMS * Introduction to SQL: Data types, Constraints * Commands in SQL: Create table, Drop command, Alter Queries in SQL * Statements in SQL (Insert, delete and update) * Features of SQL * Manipulation of data * Tables in SQL * Conclusion of the Unit |
| **4.** | **PL/SQL** |
|  | * Introduction to PL/SQL * Approaches to  database programming: with function calls, Embedded SQL using CURSORs, Dynamic SQL, SQL commands in Java, Retrieving multiple triples using Iterators * Advantages of  PL/SQL * Features of PL/SQL :Blocks structure, Error handling, Input and output designing, variables and constant, data abstraction, control structures and subprogram * Fundamentals of PL/SQL : character sets, lexical, delimeters, identifiers, declarations, scope and visibility, Static and dynamic and static SQL, Implicit and explicit locking * Conclusion of the Unit |
| **5.** | **Oracle, Trigger and wrapping** |
|  | * Introduction to **Oracle, Trigger and wrapping** * Functions/responsibilities of DBA * Oracle product details * Oracle files, System and User process * Oracle Memory * Protecting data: Oracle backup & recovery * Triggers **-** types, uses, data access for triggers * PL/SQL Packages and Wrapping * Conclusion of the Unit |

1. **RECOMMENDED STUDY MATERIAL:**

| **S. No** | | **Text Books:** | **Author** | **Edition** | **Publication** |
| --- | --- | --- | --- | --- | --- |
|  | | Database System Concepts | S. Sudarshan, Henry F. Korth, Avi Silberschatz | 6th Edition | McGraw Hill |
|  | | SQL, PL/SQL | Ivan Bayross |  | Bpb |
|  | | Oracle Complete Reference | Kevin Loney |  | Bpb |
| **Reference Book** | | | | | |
|  | PL/SQL, best practices, Bpb Publications, Steven Feuerstein | | | | |
|  | The Oracle Cook Book, Bpb Publications, Liebschuty | | | | |
|  | Oracle A Beginners Guide, TMH Publication, Michael Abbey, Michael J.Corey | | | | |
| **Online Resources** | | | | | |
|  | <https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm> | | | | |
|  | <https://nptel.ac.in/courses/106106093> | | | | |
|  | <https://www.coursera.org/learn/introduction-to-relational-databases> | | | | |

**MAPPING OF CO VS PO/PSO**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | 2 | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development



**COURSE OUTCOME**

* Describe the concepts and features of object oriented programming
* Execute java's exception handling mechanism, multithreading, packages and interfaces.
* Implement object oriented programming concepts using java
* Apply object oriented programming features and concepts for solving given problem
* Implement the concept of class and objects with access control to represent real world entities.

1. **OUTLINE OF THE COURSE**

| **Unit No.** | **Title of The Unit** | **Time required for the Unit (Hours)** |
| --- | --- | --- |
|  | **Introduction to Java** | **08** |
|  | **Working with classes ,objects and Inheritance** | **09** |
|  | **Packages, Interfaces & Exception Handling** | **09** |
|  | **Multithreaded Programming & Applet** | **07** |
|  | **JAVA Database Connectivity (JDBC) and Java 8 Features** | **07** |

1. **DETAILED SYLLABUS**

| **Unit** | **Unit Details** |
| --- | --- |
|  | **Introduction to Java** |
|  | * Introduction to Unit * History and Overview of Java * Object Oriented Programming features. * Class Fundamentals * Declaring objects, Assigning object reference variables. * Literals, variables comments, separators, * Scope and Life Time of Variables * Data types - Integers, Floating point, characters, Boolean, * Type conversion and casting * Operators - Arithmetic operators, Bit wise operators, Relational Operators, Boolean Logical operators, Assignment Operator, Operator Precedence. * Conclusion of unit |
|  | **Working with classes, objects and Inheritance** |
|  | * Introduction to Unit * Control Statements – Selection Statements - if, Switch, Iteration Statements - While, Do-while, for Nested loops, Jump statements. * Methods - constructors, “this” keyword, finalize ( ) method A stack class, Over loading methods. Using objects as parameters, Argument passing, Returning objects. * Recursion, Access control, introducing final, understanding static. * Introducing Nested and Inner classes. * Command line arguments. * Inheritance – Basics, Using super, method overriding, and Dynamic method Dispatch, Using abstract classes and final with Inheritance. * Conclusion of Unit |
|  | **Packages, Interfaces & Exception Handling** |
|  | * Introduction to Unit * Definition and Implementation, Access protection importing packages. * Interfaces: Definition and implementation. * Exception Handling – Fundamentals, types, Using try and catch * Multiple catch clauses * Nested try Statements, Throw, finally. * User Defined Exception * Conclusion of Unit |
|  | **Multithreaded Programming & Applet** |
|  | * Introduction of Unit * Java thread model – main thread, creating single Multithreading * Is alive ( ) and join ( ) Methods * Thread – Priorities, Synchronization * Inter thread communication, suspending, resuming and stopping threads * Reading control input, writing control output, Reading and Writing files. * Applet Fundamentals – AWT package * AWT Event handling concepts. * Conclusion of Unit |
|  | **JAVA Database Connectivity (JDBC) and Java 8 Features** |
|  | * Introduction to Unit * Database connectivity – JDBC architecture and Drivers. * JDBC API - loading a driver, connecting to a database, creating and executing JDBC statements * Handling SQL exceptions. * Accessing result sets: types and methods. * JDBC application to query a database. * Introduction to java 8  features :-Functional Interfaces And Lambda Expressions * Conclusion of Unit |

**C. RECOMMENDED STUDY MATERIAL**

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
| --- | --- | --- | --- | --- |
|  | The complete reference Java –2 | Herbert Schildt | V Edition, | TMH. |
|  | SAMS teach yourself Java – 2 | Rogers Cedenhead and Leura Lemay | 3rd Edition, | Pearson Education |
| **Reference Book** | | | | |
|  | The complete reference Java –2 | | | |
|  | SAMS teach yourself Java – 2 | | | |
| **Online Resources** | | | | |
|  | https://www.programiz.com/java-programming/online-compiler/ | | | |
|  | <https://www.tutorialspoint.com/compile_java_online.php> | | | |
|  | <https://onecompiler.com/java> | | | |

**MAPPING OF CO VS PO/PSO**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | 3 |  | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | \_ | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development



**COURSE OUTCOME**

The students will be able to

* Analyzea web page and identify its elements and attributes.
* Design and implement dynamic websites with good aesthetic sense of designing and
* Use web designing tools knowledge.
* Write HTML and understand how to effectively implement it in the web environment.
* Write CSS effectively to create well organized, styled web pages. Use the HTML Document

1. **OUTLINE OF THE COURSE**

| **Unit No.** | **Title of the unit** | **Time required for the Unit (Hours)** |
| --- | --- | --- |
|  | **Introduction to HTML** | **08** |
|  | **Introduction to Java Scripts** | **07** |
|  | **JDBC OBJECTS** | **09** |
|  | **Introduction to Servlet** | **07** |
|  | **Introduction to JSP** | **08** |

**B.DETAILED SYLLABUS**

| **Unit** | **Unit Details** |
| --- | --- |
|  | **Introduction to HTML** |
|  | * Introduction of Unit * Core Elements, Links and Addressing, * Images, Text, Colors and Background, * Lists, Tables and Layouts, * Frames, * Forms, * Cascading Style Sheets * Conclusion of Unit |
|  | **Introduction to Java Scripts** |
|  | * Introduction of Unit * Elements of Objects in Java Script, * Dynamic HTML with Java Script * Document type definition, XML Syntax, XML Schemas, * Document Object model, Presenting XML, Using XML Processors * Conclusion of Unit |
|  | **JDBC OBJECTS** |
|  | * Introduction of Unit * JDBC Driver Types, * JDBC Packages, Database Connection, Statement Objects, Result Set * JDBC and Embedded SQL * Tables, Inserting Data into Tables, Selecting Data from a Table, * Meta Data, Updating Table, deleting data from Table, * Joining Table, Calculating Data, * Grouping and Ordering Data, Sub quires, View * Conclusion of Unit |
|  | **Introduction to Servlet** |
|  | * Introduction of Unit * Servlet Life Cycles, Servlet Basics, * Tomcat Web Server, Configuring Apache Tomcat, * Handling Client Request and Response, * Handling Cookies, * Session Tracking * Conclusion of Unit |
|  | **Introduction to JSP** |
|  | * Introduction of Unit * Benefits of JSP, Basic Syntax, * Invoking Java code with JSP Scripting * Elements, JSP Page Directive, * Including Files in JSP Pages, Introduction to Java Beans, * Using JAVA Bean Components in JSP Documents, * MVC Architecture * Conclusion of Unit |

**C.RECOMMENDED STUDY MATERIAL**

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
| --- | --- | --- | --- | --- |
|  | Web Programming, building internet applications | Chris Bates, Dreamtech | Latest | Wiley |
|  | The complete Reference HTML and DHTML | A. Powey | Latest | Thomas |
|  | The complete Reference J2ME, | James Keogh | Latest | - |
|  | Core Servlets and Java Server Pages | Marty Hall Larry Brown | Latest | - |
| **Reference Book** | | | | |
|  | Internet, World Wide Web, How to program, Dietel , Nieto, PHI/PEA | | | |
|  | Web Tehnologies, Godbole, Kahate, 2nd Ed., TMH | | | |
| **Online Resources** | | | | |
|  | <https://nptel.ac.in/courses/106105084> | | | |
|  | <https://www.tutorialspoint.com/web_developers_guide/web_basic_concepts.htm> | | | |

**MAPPING OF CO VS PO/PSO**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | 3 | 2 | 1 | - | - | - | - | - | - | - | - | - | - | - |

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

**PRACTICALS**



**Course Outcomes:**

Students will be able to:

* Design an algorithm in a effective manner
* Apply iterative and recursive algorithms.
* Design iterative and recursive algorithms.
* Implement optimization algorithms for specific applications.
* Design optimization algorithms for specific applications

**LIST OF EXPERIMENTS:**

| 1 | Sort a given set of elements using the Quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted. The elements can be read from a file or can be generated using the random number generator. |
| --- | --- |
| 2 | Implement a Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted .The elements can be read from a file or can be generated using the random  number generator. |
| 3 | A. Obtain the Topological ordering of vertices in a given digraph.  B. Compute the transitive closure of a given directed graph using Warshall's algorithm. |
| 4 | Implement 0/1 Knapsack problem using Dynamic Programming. |
| 5 | From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijikstra’s algorithm |
| 6 | Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal’s algorithm. |
| 7 | A. Print all the nodes reachable from a given starting node in a digraph using  BFS method.  B. Check whether a given graph is connected or not using DFS method. |
| 8 | Find a subset of a given set S = {s1, s2,….., sN} of n positive integers whose sum is equal to a given positive integer d. For example, if S= {1, 2, 5, 6, 8} and d = 9 there are two solutions {1,2,6}and{1,8}.A suitable message is to be displayed if the given problem instance doesn't have a solution. |
| 9 | Implement any scheme to find the optimal solution for the Traveling Salesperson problem and then solve the same problem instance using any  approximation algorithm and determine the error in the approximation. |
| 10 | Find Minimum Cost Spanning Tree of a given undirected graph using Prim’s algorithm. |
| 11 | Implement All-Pairs Shortest Paths Problem using Floyd's algorithm. |
| 12 | Implement N Queen's problem using Back Tracking. |

1. **RECOMMENDED STUDY MATERIAL**

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
| --- | --- | --- | --- | --- |
| 1 | Design and analysis of Algorithms | Aho A.V , J.D Ulman | Third Edition | Addison Wesley |
| 2 | Design and Analysis of Algorithms | Dave and Dave | Second Edition | Pearson |
| **Reference Book** | | | | |
| 1 | Introduction to Algorithms, Cormen, Leiserson, Rivest, Prentice Hall of India | | | |
| 2 | Fundamental of Computer algorithms, Horowitz and Sahani | | | |
| **Online Resources** | | | | |
| 1 | https://www.tutorialspoint.com/design\_and\_analysis\_of\_algorithms/index.htm | | | |
| 2. | <https://nptel.ac.in/courses/106106131> | | | |
| 3. | Design and analysis of Algorithms | | | |

**MAPPING OF CO VS PO/PSO**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | - | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development



**Course Outcome:-**

Students will be able:

* Appreciate, define and effectively demonstrate the underlying concepts of database technologies.
* Design and implement a database schema for a given problem-domain.
* Populate and query a database using SQL DML/DDL commands.
* Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS.
* Programming PL/SQL including stored procedures, stored functions, cursors, packages.

1. **LIST OF EXPERIMENTS:**

|  | To setup and removal phases of a Student database using the basic Data Definition Language (DDL) commands:  1. CREATE  2. ALTER  3. DROP  4. RENAME  5. TRUNCATE |
| --- | --- |
|  | The routine operation of the Employee database like retrieve, insert and modify by basic Data Manipulation Language (DML) commands:  1. INSERT  2. UPDATE  3. DELETE |
|  | To Retrieve data from one or more tables using DATA RETRIEVAL LANGUAGE (DRL) commands   * SELECT FROM * SELECT - FROM –WHERE * SELECT - FROM -GROUP BY * SELECT - FROM -ORDER BY * JOIN using SELECT - FROM - ORDER BY * JOIN using SELECT - FROM - GROUP BY * UNION * INTERSET * MINUS |
|  | DATA CONTROL LANGUAGE (DCL) and TRANSATIONAL CONTROL LANGUAGE (TCL) commands.   1. Creating objects: tables, views, users, sequences, Collections etc. 2. Privilege management through the Grant and Revoke commands 3. Transaction processing using Commit and Rollback 4. Save points. |
|  | Queries for following functions   1. Conversion functions (to\_char, to\_number and to\_date) 2. string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), 3. date functions (Sysdate, next\_day, add\_months, last\_day, months\_between, least, greatest, trunc, round, to\_char, to\_date) |
|  | Simple queries: selection, projection, sorting on a simple table for employee database   1. Small-large number of attributes 2. Distinct output values 3. Renaming attributes 4. Computed attributes 5. Simple-complex conditions (AND, OR, NOT) 6. Partial Matching operators (LIKE, %, \_, \*, ?) 7. ASC-DESC ordering combinations 8. Checking for Nulls |
|  | To manipulate data items and returning the results using Group functions or Aggregate functions and Single Row or scalar functions:   1. Group functions or Aggregate functions: Sum(), Avg(), Min(), Max() and Count() 2. Single Row or scalar function: Abs(), Power(), Sqrt(), Round(), Exp(), Greastest(), Least(), Mod(), Floor(), Sign() and Log(). |
|  | Multi-table queries (JOIN OPERATIONS)   1. Simple joins (no INNER JOIN) 2. Aliasing tables – Full/Partial name qualification 3. Inner-joins (two and more (different) tables) 4. Inner-recursive-joins (joining to itself) 5. Outer-joins (restrictions as part of the WHERE and ON clauses) 6. Using where & having clauses |
|  | Write Nested queries to retrieve the name of each employee who has a dependent with the same first name and same sex as the employee using following Nested queries.   1. In, Not In 2. Exists, Not Exists 3. Dynamic relations (as part of SELECT, FROM, and WHERE clauses) |
|  | Write a query to make a list of all project numbers for projects that involve an employee whose last name is ‘Smith’, either as a worker or as a manager of the department that controls the project using the following Set Oriented Operations   1. Union 2. Difference 3. Intersection 4. Division |
|  | PL/SQL Programming using the following   1. Programs using named and unnamed blocks 2. Programs using Cursors, Cursor loops and records |
|  | PL/SQL Programming using   1. Creating stored procedures, functions and packages 2. Error handling and Exception 3. Triggers and auditing triggers |

1. **RECOMMENDED STUDY MATERIAL**

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
| --- | --- | --- | --- | --- |
|  | Database System Concepts | S. Sudarshan, Henry F. Korth, Avi Silberschatz | 6th Edition | McGraw Hill |
|  | SQL, PL/SQL | Ivan Bayross |  | Bpb |
|  | Oracle Complete Reference | Kevin Loney |  | Bpb |
| **Reference Book** | | | | |
|  | PL/SQL, best practices, Bpb Publications, Steven Feuerstein | | | |
|  | The Oracle Cook Book, Bpb Publications, Liebschuty | | | |
|  | Oracle A Beginners Guide, TMH Publication, Michael Abbey, Michael J.Corey | | | |
| **Online Resources** | | | | |
|  | https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm | | | |
|  | <https://nptel.ac.in/courses/106106093> | | | |
|  | https://www.coursera.org/learn/introduction-to-relational-databases | | | |

**MAPPING OF CO VS PO/PSO**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | - | -- | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development



**Course Outcomes:**

Students will be able to:

* Implement object oriented programming concepts to solve real world problems
* Implement the concept of class and objects with access control to represent real world entities.
* Apply different techniques on creating and accessing packages (fully qualified name and import statements).
* Create concepts on file streams and operations in java programming for a given application programs
* Create the backend connectivity process in java program by using JDBC drivers

1. **LIST OF EXPERIMENTS:**

| 1 | A. Write a program to print “Hello World” in Java.   B. Write a program to add two numbers  C.   Write a program to demonstrate the different access specifiers  D. Write a program which uses different packages |
| --- | --- |
| 2 | A. Write a program to demonstrate inheritance, abstraction, encapsulation and Polymorphism.  B. Write a program to find the factorial of n numbers  C.  Write a program to calculate Fibonacci series  D.  Write a program to add n numbers and series |
| 3 | A.  Write a program to create an array and store elements into the array.  B. Write a program to find the sum of elements in an array  C.  Write a program to demonstrate switch case, if, if-else and for loop |
| 4 | A. Write a program to demonstrate the working of methods.  B. Write a program which has four methods – add(), subtract(), multiply() and divide() and demonstrate a simple console calculator.  C. Write a program to accept command line arguments and display them to the user |
| 5 | A. Write a program to create a package.  B. Write a program to handle different exceptions |
| 6 | A.Write a program to demonstrate try-catch, throw and throws.  B. Write a program for user defined exception |
| 7 | A. Write a program to read a file  Write a program to write into a file |
| 8 | Write a program to demonstrate client server communication (socket programming) |
| 9 | Write a program to create threads and manipulate them |
| 10 | Write a program to create a user interface to check user authentication. |
| 11 | Write a program to create a registration form and save the details into a file |
| 12 | Write a program to save and fetch the details from  database |

1. **RECOMMENDED STUDY MATERIAL**

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
| --- | --- | --- | --- | --- |
|  | The complete reference Java –2 | Herbert Schildt | V Edition, | TMH. |
|  | SAMS teach yourself Java – 2 | Rogers and Leura Lemay | 3rd Edition, | Pearson Education |
| **Reference Book** | | | | |
|  | The complete reference Java –2 | | | |
|  | SAMS teach yourself Java – 2 | | | |
| **Online Resources** | | | | |
|  | https://www.programiz.com/java-programming/online-compiler/ | | | |
|  | <https://www.tutorialspoint.com/compile_java_online.php> | | | |
|  | <https://onecompiler.com/java> | | | |

**MAPPING OF CO VS PO/PSO**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | 1 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development



**Course Outcome:-**

Students will be able to:

* Run web programming
* Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's.
* Describe Web Application Terminologies, Internet Tools, E – Commerce and other web services.
* Define Database Connectivity to web applications.
* Familiarize with Client-Side Programming, Server-Side Programming, Active server Pages.

1. **LIST OF EXPERIMENTS:**

|  | Design of the Web pages using various features of HTML and DHTML |
| --- | --- |
|  | Client server programming using Servlets, ASP and JSP on the server side and java script on the client side |
|  | Web enabling of databases |
|  | Multimedia effects on web pages design using Flash. |
|  | Case Study: Design & Development of Websites with Database Connectivity and Multimedia Effects |
|  | Creating Online shopping |
|  | Creating Online examination |
|  | Design Chat system |
|  | Design Mailing system |
|  | Design a university home page |
|  | Design navigation on university home page |
|  | Design a website as minor project |

1. **RECOMMENDED STUDY MATERIAL**

| **S. No** | | **Text Books:** | **Author** | | **Edition** | | **Publication** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | Web Programming, building internet applications | | Chris Bates, Dreamtech | | Latest | | Wiley |
|  | | The complete Reference HTML and DHTML | | A. Powey | | Latest | | Thomas |
|  | | The complete Reference J2ME, | | James Keogh | | Latest | | - |
|  | | Core Servlets and Java Server Pages | | Marty Hall Larry Brown | | Latest | | - |
| **Reference Book** | | | | | | | | |
|  | Internet, World Wide Web, How to program, Dietel , Nieto, PHI/PEA | | | | | | | |
|  | Web Tehnologies, Godbole, Kahate, 2nd Ed., TMH | | | | | | | |
| **Online Resources** | | | | | | | | |
|  | <https://nptel.ac.in/courses/106105084> | | | | | | | |
|  | https://www.tutorialspoint.com/web\_developers\_guide/web\_basic\_concepts.htm | | | | | | | |

**MAPPING OF CO VS PO/PSO**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | - | 1 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | 1 | 2 | 3 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | 1 | 2 | 3 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | 1 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | 1 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

**Department Electives**

**Theory**



**COURSE OUTCOME**

Students should be able to:

* Describe the organization of basic computer, its design and the design of control unit.
* Demonstrate the working of central processing unit and RISC and CISC Architecture.
* Examine the operations and language, register transfer, micro operations and input- output organization.
* Describe the organization of memory and memory management hardware.
* Elaborate advanced concepts of computer architecture, Parallel Processing, inter processor communication and synchronization.

1. **OUTLINE OF THE COURSE**

| **Unit No.** | **Title of the unit** | **Time required for the Unit (Hours)** |
| --- | --- | --- |
|  | **Register Transfer and Micro-operation** | **08** |
|  | **Basic Computer Organization** | **08** |
|  | **Micro Programmed Control Unit** | **08** |
|  | **Computer Arithmetic** | **07** |
|  | **Modes of Data Transfer and Memory Organization** | **07** |

**B.DETAILED SYLLABUS**

| **Unit** | **Unit Details** |
| --- | --- |
| **1.** | **Register Transfer and Micro-operation** |
|  | * Introduction of Unit * Subsystems of computer: Von Neuman Architecture, Flynn Classification, Sequential and combinational devices * Register Transfer Language, Register Transfer, Bus and Memory Transfer: Three state bus buffers, Memory Transfer. * Arithmetic Micro-operations: Binary Adder, Binary Adder-Sub trator, Binary Incrementor, * Logic Micro-operations: List of Logic micro operations, Shift Micro-operations (excluding H/W implementation), Arithmetic shifting. * Arithmetic Logical Shift Unit. * Conclusion &Real Life Application |
| **2.** | **Basic Computer Organization** |
|  | * Introduction of Unit * Instruction Codes, * Computer Registers: Common bus system, Computer Instructions: * Timing and Control unit * Instruction formats, Instruction Cycle: Fetch and Decode, Flowchart for Instruction cycle, * Memory-reference instructions * Register reference instructions. * IO reference Instructions. * Conclusion &Real Life Application |
| **3.** | **Micro Programmed Control Unit** |
|  | * Introduction of Unit * Control Memory, Address Sequencing, Conditional branching, Mapping of instruction, Subroutines. * Design of Control Unit, Central Processing Unit: Introduction, * General Register Organization, * Stack Organization: Register stack, Memory stack; * Three address, two address, one address, Zero address Instruction Formats, * Conclusion &Real Life Application |
| **4.** | **Computer Arithmetic** |
|  | * Introduction of Unit * Introduction, Addition and Subtraction, * Multiplication Algorithms (Booth algorithm), Division Algorithms, * Input – Output Organization: Peripheral devices, Input – Output interface, Introduction of Multiprocessors: Characteristics of multi-processors. * Conclusion &Real Life Application |
| **5.** | **Modes of Data Transfer and Memory Organization** |
|  | * Introduction of Unit * Input-Output Organization: * Input-Output Interface * Modes of Data Transfer: Priority Interrupt, Direct Memory Access, * Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, * Introduction of Associative Memory, Cache Memory, Virtual Memory * Conclusion &Real Life Application |

**C.RECOMMENDED STUDY MATERIAL**

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
| --- | --- | --- | --- | --- |
| 1. | Computer System Architecture | Morris Mano | Latest | PHI |
| 2. | Computer Organization and  Architecture | William Stallings | Latest | PHI |
| **Reference Book** | | | | |
| 1. | Digital Computer Electronics: | An Introduction to  Microcomputers by Malvino | Latest | TMH |

**MAPPING OF CO VS PO/PSO**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | - | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development



**COURSE OUTCOME**

* Describe soft computing techniques and their applications.
* Analyze various neural network architectures.
* Define the fuzzy systems.
* Implement the genetic algorithm concepts and their applications.
* Identify and select a suitable Soft Computing technology to solve the problem.

1. **OUTLINE OF THE COURSE**

| **Unit No.** | **Title of The Unit** | **Time required for the Unit (Hours)** |
| --- | --- | --- |
|  | Introduction to Soft Computing | **8** |
|  | Fuzzy Logic | **7** |
|  | Artificial Neural Networks | **7** |
|  | Nature Inspired Algorithms | **8** |
|  | Multi-Objective Optimization | **8** |

**B.DETAILED SYLLABUS**

| **Unit** | **Unit Details** |
| --- | --- |
|  | Introduction to Soft Computing |
|  | * Introduction of Unit * Concept of Computing Systems * Soft Computing Versus Hard Computing * Characteristics of Soft Computing, * Applications of Soft Computing Techniques * Conclusion of Unit |
|  | Fuzzy Logic |
|  | * Introduction of Unit * Fuzzy Sets and Membership Functions, * Operations on Fuzzy Sets, * Fuzzy Relations, Rules, Propositions, * Implications and Inferences, * Defuzzification Techniques - Fuzzy Logic Controller Design, * Applications of Fuzzy Logic * Conclusion of Unit |
|  | Artificial Neural Networks |
|  | * Introduction of Unit * Biological Neurons and its Working, * Simulation of Biological Neurons to Problem Solving, * Different ANNs Architectures, * Training Techniques for ANNs, * Applications of ANNs to Solve Real Life Problems * Conclusion of Unit |
|  | Nature Inspired Algorithms |
|  | * Introduction of Unit * Genetic Algorithms, Concept of "Genetics" and "Evolution" * Application to Probabilistic Search Techniques, * Basic GA Framework and Different GA Architectures, GA Operators- Encoding, Crossover, Selection, Mutation, etc., * Solving Single-Objective Optimization Problems Using GAs, Particle Swarm Optimization- Implementation, Operators, * Ant Bee Colony Optimization Implementation, Operators, Case Studies. * Conclusion of Unit |
|  | Multi-Objective Optimization |
|  | * Introduction of Unit * Problem Solving Concept of Multi-Objective Optimization Problems (MOOPs) and Issues of Solving Them. * Multi-Objective Evolutionary Algorithm (MOEA), * Non-Pareto Approaches to Solve MOOPs, * Pareto-Based Approaches to Solve MOOPs, * Applications with MOEAs. * Conclusion of Unit |

**C.RECOMMENDED STUDY MATERIAL**

| **S. No** | **Textbooks:** | **Author** | **Edition** | **Publication** |
| --- | --- | --- | --- | --- |
|  | Principles of soft computing | Sivanandam.S. N, Deepa.S.N | Second Edition | Wiley India Pvt Limited, 2011 |
|  | “Neuro fuzzy and soft computing | Juh Shing Roger Jang, Cheun Tsai Sun, Eiji Mizutani | Fourth Edition | Prentice Hall, 1997 |
| **Reference Book** | | | | |
|  | Aliev,R.A, Aliev,R.R, “Soft Computing and its Application”, World Scientific Publishing Co. Pvt. Ltd., 2001 | | | |
|  | Mehrotra.K, Mohan.C.K, Ranka.S, “Elements of Artificial Neural Networks”, The MIT Press, 1997 | | | |
|  | Juh Shing Roger Jang,Cheun Tsai Sun,Eiji Mizutani, “Neuro fuzzy and soft computing”, Prentice Hall, 1997. | | | |
|  | Ronald R.Yager, Lofti Zadeh, “An Introduction to fuzzy logic applications in intelligent Systems”, Kluwer Academic, 1992. | | | |
|  | Cordón.O, Herrera.F, Hoffman.F, Magdalena.L “Genetic Fuzzy systems”, World Scientific Publishing Co. Pvt. Ltd., 2001. | | | |
| **Online Resources** | | | | |
|  | <https://www.w3schools.com/ai/ai_neural_networks.asp> | | | |
|  | <https://www.javatpoint.com/what-is-soft-computing> | | | |

**MAPPING OF CO VS PO/PSO**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | - | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | - | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | 2 | 2 | 3 | 1 | - | - | - | - | - | - | - | - | - | - |

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development



**COURSE OUTCOME**

The student would be able to:

* Describe general concepts of Internet of Things (IoT) and identify various devices, sensors and applications
* Apply design concept to IoT solutions
* Analyze various M2M and IoT architectures
* Evaluate design issues in IoT applications
* Create IoT solutions using sensors, actuators and Devices

**A. OUTLINE OF THE COURSE**

| **Unit No.** | **Title of the unit** | **Time required for the Unit (Hours)** |
| --- | --- | --- |
| **1.** | **INTRODUCTION TO IOT** | **8** |
| **2.** | **IOT NETWORKING CORE** | **8** |
| **3.** | **IOT ARCHITECTURE** | **7** |
| **4.** | **IOT APPLICATION DEVELOPMENT** | **8** |
| **5.** | **INDUSTRIAL IOT** | **7** |

**B**

**B.DETAILED SYLLABUS**

| **Unit** | **Unit Details** |
| --- | --- |
| **1.** | **INTRODUCTION TO IOT** |
|  | * Introduction of Unit * IoT Definition, Characteristics of IoT * Functional Blocks, Physical design of IoT, Logical design of IoT * Communication models & APIs * Sensors, Actuators, Networking basics, * Communication Protocols * Sensor Networks * Conclusion of Unit |
| **2.** | **IOT NETWORKING CORE** |
|  | * Introduction to unit * Introduction to Arduino Programming * Integration of Sensors and Actuators with Arduino * Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi * Other IoT supported hardware platforms such as: ARM Cortex Processors, Intel Galileo boards * Wireless networking equipment and configurations * Accessing hardware and device file interactions * Conclusion of Unit |
| **3.** | **IOT ARCHITECTURE** |
|  | * Introduction of Unit * IoT reference Model and Architecture * Remote monitoring and sensing * Remote controlling and performance analysis * Communication pattern, 6LoWPAN, * Sensors and sensor Node and interfacing using any Embedded target boards * Conclusion of Unit |
| **4.** | **IOT APPLICATION DEVELOPMENT** |
|  | * Introduction of Unit * Introduction to Node MCU * Node MCU Pin Description * Programming of NodeMCU using Arduino IDE * Application protocols: MQTT, REST/HTTP, CoAP, MySQL * Back-end Application Designing * Apache for handling HTTP Requests * Conclusion of Unit |
| **5.** | **INDUSTRIAL IOT** |
|  | * Introduction of Unit * Cloud Computing Platforms for IoT * Data Handling and Analytics * Sensor-Cloud, Cloud Computing Services for IoT * Case Study: Agriculture, Healthcare, Activity Monitoring * Conclusion of Unit |

**C.RECOMMENDED STUDY MATERIAL**

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
| --- | --- | --- | --- | --- |
| 1. | Internet of Things: Architectures, Protocols and Standards | Simone Cirani, Gianluigi, Marco, and Luca Veltri | Latest | WILEY |
| 2. | Internet of Things | RMD Sundaram Shriram K Vasudevan, Abhishek S | Latest | WILEY |
| **Reference Book** | | | | |
| 1. | Designing the Internet of Things, Adrian McEwen, Hakim Cassimally, John Wiley and Sons | | | |
| 2. | Internet of Things (A Hands-on Approach), Vijay Madisetti and Arshdeep Bahga,1st Edition, VPT, 2014 | | | |
| **Online Resources** | | | | |
| 1 | <https://onlinecourses.nptel.ac.in/noc22_cs53/preview> | | | |
| 2 | https://www.tutorialspoint.com/internet\_of\_things/index.htm | | | |

**MAPPING OF CO VS PO/PSO**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | 3 |  | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** |  |  | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | 3 |  | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** |  | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** |  | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - |

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

**Ability Enhancement Courses (AEC)**



**Course Outcomes:**

Students will be able to:

* Prepare and deliver a clear and fluent demonstrative, informative, and persuasive presentation and enlarge their vocabulary by keeping a vocabulary journal.
* Classify the factors that influence use of grammar and vocabulary in speech and writing.
* Recognize and Consciously Use English to Create and Maintain Productive work in professional and educational settings.
* Enhance their language proficiency in writing by identifying the errors and rectifying them.
* Generate a pile of ideas by examining issues in greater depth, looking at different dimensions of these issues.

1. **OUTLINE OF THE COURSE**

| **Unit No.** | **Title of the Unit** | **Time required for the Unit (Hours)** |
| --- | --- | --- |
| **1** | **Speaking Skills Enhancement Training** | **6** |
| **2** | **Vocabulary Building Training** | **7** |
| **3** | **Proficiency in English** | **4** |
| **4** | **Written Communication Skill** | **6** |
| **5** | **Group Discussion** | **6** |

1. **DETAILED SYLLABUS**

| **Unit** | **Unit Details** |  |
| --- | --- | --- |
|  | **Speaking Skills Enhancement Training** | **Method** |
|  | * Introduction of the Course & the topic * Describing people – Appearance & Character * Correcting common mistakes while speaking English. * Appreciating & Criticizing: Events & Performances * Preparing speech on different situations. * Practice Session * Conclusion & Summary of the Unit | * Theory/Practical * Practical * Practical * Theory/Practical * Practical * Practical * Theory/Practical |
|  | **Vocabulary Building Training** |  |
|  | * Introduction of the topic * Vocabulary for situational dialogues * Phrasal Verbs & Idioms * Vocabulary for speeches and descriptions * Developing Professional Vocabulary * Practice Sessions * Conclusion & Summary of the Unit | * Theory/Practical * Theory/Practical * Theory/Practical * Theory/Practical * Theory/Practical * Practical * Theory/Practical |
|  | **Proficiency in English** |  |
|  | * Introduction of the topic * Feedback and questioning Technique * Objectiveness in Argument * Development etiquettes and manners * Study of different pictorial expression of non-verbal communication and its analysis * Practice Session * Conclusion & Summary of the Unit | * Theory / Practical * Theory/Practical * Practical * Practical * Theory/Practical * Practical * Theory/Practical |
|  | **Written Communication Skill** |  |
|  | * Introduction of the topic * Correction of errors * Making of Sentences * Paragraph Writing * Conclusion & Summary of the Unit | * Theory/Practical * Practical * Practical * Practical * Theory/Practical |
|  | **Group Discussion** |  |
|  | * Introduction of the topic * Face your Fear & Speak with Confidence * Introduction to Group Discussion * Important Do’s & Don’ts of GD. * Practice Session * Conclusion & Summary of the Unit | * Theory/Practical * Practical * Practical * Practical * Practical * Theory/Practical |

**Skill Enhancement Courses (SEC)**



**COURSE OUTCOMES:**

Students will be able to:

CO.1: Enhance problem solving skills.

CO.2: Prepare for various public and private sector exams & placement drives

CO.3: Communicate effectively & appropriately in real life situation.

CO.4: Improve verbal ability skill among students.

CO.5: Enrich their knowledge and to develop their logical reasoning thinking ability.

| **LIST OF LABS** | |
| --- | --- |
| 1 | Types of Interviews, Interview Practice |
| 2 | Time & Work, Syllogisms |
| 3 | Critical Reasoning |
| 4 | Mensuration, Cubes & Dices |
| 5 | Para Jumble, Permutations & Combinations |
| 6 | Blood Relations & Direction Sense, Manners & Etiquette |
| 7 | Idiom & Phrases, Prefix-Suffix |
| 8 | Probability. Puzzles |
| 9 | Data Sufficiency, Logical Choices & Connectives |
| 10 | Date Interpretations, Deductions |
| 11 | Essay Writing, E-mail Writing |
| 12 | Personal Grooming |



**OBJECTIVE:** To expose engineering students to technology development at workplaces and appraise them regarding shop-floor problems. To provide practical experience in solving open ended problems in real work setting so as to cause transfer of college based knowledge and skills to solve practical problems and thereby develop confidence in the students in the analysis, synthesis and evaluation of practical problems leading to creative thinking.

At the end of the second semester each student would undergo Industrial Training in an industry/ Professional organization / Research Laboratory with the prior approval of the Head of Department and Training & Placement Officer, and shall be required to submit a written typed report along with a certificate from the organization and present a PPT based on the training.

This period shall include orientation and preparation for the said Training incorporated in the curriculum after second semester.

The report of the Training shall be evaluated during III Semester by a Board of Examiners to be appointed by the Faculty Coordinator-Training Seminar who will award the grades.